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1950/51

CHICAGO PROFESSIONAL COLLEGES
University of Illinois

GRADUATE COLLEGE

DENTISTRY
MEDICINE
PHARMACY

1950
1951
CATALOG

CHICAGO PROFESSIONAL COLLEGES
University of Illinois

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DENTISTRY
MEDICINE
PHARMACY

1950-1951

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George Robert Moon, A.M., Examiner and Recorder for the Chicago Departments

Howard Albert Hazleton, B.S., Business Manager for the Chicago Departments

CALENDAR

1950 — Fall Quarter

September 25, Monday	Registration. Room 384 DMP.
September 29, Friday	Latest date for registration of former students without penalty.
September 29, Friday	Latest date to apply for French and German examinations.
October 9, Monday	Latest date for change in course of study without fee. Room 384.
October 13, Friday	Language examinations. Room 384. 2:00 P.M.
November 3, Friday	Latest date for preliminary examinations (for full residence).
November 23, Thursday	Thanksgiving Day.
December 16, Saturday	Fall quarter ends.

1951 — Winter Quarter

January 2, Tuesday	Registration. Room 384 DMP.
January 5, Friday	Latest date for registration of former students without penalty.
January 5, Friday	Latest date to apply for French and German examinations.
January 15, Monday	Latest date for change in course of study without fee. Room 384.
January 19, Friday	Language examinations. Room 384. 2:00 P.M.
February 15, Thursday	Latest date to apply for Graduate College fellowships for 1951-1952.
March 24, Saturday	Winter quarter ends. Spring vacation begins.

1951 — Spring Quarter

April 2, Monday	Spring vacation ends.
April 2, Monday	Registration. Room 384 DMP.
April 6, Friday	Latest date for registration of former students without penalty.
April 6, Friday	Latest date to apply for French and German examinations.
April 6, Friday	Latest date to apply for degree to be conferred in June. Room 384.
April 9, Monday	Latest date for change in course of study without fee. Room 384.
April 20, Friday	Language examinations. Room 384. 2:00 P.M.
April 27, Friday	Latest date for preliminary examinations (for full residence).
May 21, Monday	Latest date for candidates for M.S. or Ph.D. degree in June to deposit thesis, file application for degree, and secure clearance slip. Room 384.
May 30, Wednesday	Memorial Day.
June 1, Friday	Latest date for finals for Ph.D. degree.
June 4, Monday	Latest date for oral examination for candidates for M.S. degree.
June 15, Friday	Commencement.
June 23, Saturday	Spring quarter ends.

1951 — Summer Quarter

June 25, Monday	Registration. Room 384 DMP.
June 29, Friday	Latest date for registration of former students without penalty.
June 29, Friday	Latest date to apply for French and German examinations.
July 4, Wednesday	Independence Day.

July 9, Monday	Latest date for change in course of study without fee. Room 384.
July 13, Friday	Language examinations. Room 384. 2:00 P.M.
September 3, Monday	Labor Day.
September 15, Saturday	Summer quarter ends.

1951 — Fall Quarter

October 1, Monday	Registration. Room 384 DMP.
October 5, Friday	Latest date for registration of former students without penalty.
October 5, Friday	Latest date to apply for French and German examinations.
October 15, Monday	Latest date for change in course of study without fee. Room 384.
October 19, Friday	Language examinations. Room 384. 2:00 P.M.
November 9, Friday	Latest date for preliminary examinations (for full residence).
November 22, Thursday	Thanksgiving Day.
December 22, Saturday	Fall quarter ends.

1952 — Winter Quarter

January 7, Monday	Registration. Room 384 DMP.
January 11, Friday	Latest date for registration of former students without penalty.
January 11, Friday	Latest date to apply for French and German examinations.
January 21, Monday	Latest date for change in course of study without fee. Room 384.
January 25, Friday	Language examinations. Room 384. 2:00 P.M.
February 15, Friday	Latest date to apply for Graduate College fellowships for 1952-1953.
March 29, Saturday	Winter quarter ends. Spring vacation begins.

1952 — Spring Quarter

April 7, Monday	Spring vacation ends.
April 7, Monday	Registration. Room 384 DMP.
April 11, Friday	Latest date for registration of former students without penalty.
April 11, Friday	Latest date to apply for French and German examinations.
April 11, Friday	Latest date to apply for degree to be conferred in June. Room 384.
April 14, Monday	Latest date for change in course of study without fee. Room 384.
April 25, Friday	Language examinations. Room 384. 2:00 P.M.
May 2, Friday	Latest date for preliminary examinations (for full residence).
May 26, Monday	Latest date for candidates for M.S. or Ph.D. degree in June to deposit thesis, file application for degree, and secure clearance slip. Room 384.
May 30, Friday	Memorial Day.
June 6, Friday	Latest date for finals for Ph.D. degree.
June 9, Monday	Latest date for oral examination for candidates for M.S. degree.
June 20, Friday	Commencement.
June 28, Saturday	Spring quarter ends.

1952 — Summer Quarter

June 30, Monday	Registration. Room 384 DMP.
July 4, Friday	Independence Day.
July 7, Monday	Latest date for registration of former students without penalty.
July 7, Monday	Latest date to apply for French and German examinations.
July 14, Monday	Latest date for change in course of study without fee. Room 384.
July 18, Friday	Language examinations. Room 384. 2:00 P.M.
September 1, Monday	Labor Day.
September 20, Saturday	Summer quarter ends.

1952 — Fall Quarter

September 29, Monday	Registration. Room 384 DMP.

Notes

Registrant is classified as a first-year student until he has completed work toward the M.S. degree and as a second-year student until he has passed the preliminary examination.

Examination in one foreign language (French or German) must be passed before residence on second year may be counted. No language is required of M.S. candidates.

Two copies of the thesis are required of all candidates. For special information concerning thesis form, paper used, etc., see secretary in Room 384 Dental, Medical, and Pharmacy Building.

Candidates for master's degree announce thesis subjects at time of registration for the final quarter of work. Petition for change of thesis title must be made to the Assistant Dean.

Candidates for Ph.D. degree announce thesis subjects within six weeks after registering for third year in residence. Petition must be made to the Assistant Dean to change thesis title.

Assistants or others on full-time appointments are allowed a maximum of one unit per quarter; those on half-time may register for two units and proportionately more or less depending on fractional time of appointment. Dental and medical students, who qualify for graduate work, may register for two-thirds unit per quarter. Three units per quarter constitute a full-time graduate program. One unit represents a minimum of thirteen clock hours of laboratory work per week for one quarter.

GRADUATE COLLEGE EXECUTIVE FACULTY

George Dinsmore Stoddard, Ph.D., Litt.D., L.H.D., LL.D.
President of the University

Louis Nicot Ridenour, Ph. D., Professor of Physics and Dean of the Graduate College

Andrew Conway Ivy, Ph.D., M.D., D.Sc., LL.D., Distinguished Professor of Physiology, Head of the Department of Clinical Science, and Vice-President of the University in Charge of the Chicago Professional Colleges

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Stewart Scott Cairns, Ph.D., Professor of Mathematics and Head of the Department

Francis G. Cornell, Ph.D., Professor of Education and Director of the Bureau of Research and Service

F. Wheeler Loomis, Ph.D., Professor of Physics and Head of the Department

William Addison Neiswanger, Jr., Ph.D., Professor of Economics

Norman Alwyn Parker, M.S., M.E., Professor of Mechanical Engineering and Head of the Department

Helmut Rehder, Ph.D., Professor of German, Head of the Department, and Chairman of the Division of the Humanities

Elmer Roberts, Ph.D., Professor of Animal Genetics

William Cumming Rose, Ph.D., D.Sc., Professor of Biochemistry

Glenn Wade Salisbury, Ph.D., Professor of Dairy Science and Head of the Department

Allen Stuart Weller, Ph.D., Professor of Art and Head of the Department

George Willard White, Ph.D., Professor of Geology and Head of the Department

Joseph Royall Smiley, Ph.D., Assistant Professor of French and Assistant Dean of the Graduate College

Milan Vaclav Novak, Ph.D., M.D., D.Sc., Professor of Bacteriology, Head of the Department, and Assistant Dean of the Graduate College for the Chicago Professional Colleges

COMMITTEE ON GRADUATE WORK IN DENTISTRY, MEDICINE, AND PHARMACY

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Warren Henry Cole, B.S., M.D.

Otto Frederic Kampmeier, Ph.D., M.D.

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Eric Oldberg, Ph.D., M.D.

Carl Curt Pfeiffer, Ph.D., M.D.

Isaac Schour, Ph.D., D.D.S., D.Sc.

Earl Roy Serles, Ph.D.

George Earle Wakerlin, Ph.D., M.D.

George Lewis Webster, Ph.D.

HEADS OF DEPARTMENTS ADMINISTERING CURRICULA LEADING TO ADVANCED DEGREES

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Bacteriology	Milan Vaclav Novak
Biological Chemistry	Otto Arthur Bessey
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Histology	Isaac Schour
Medicine	Robert Wood Keeton
Obstetrics and Gynecology	Frederick Howard Falls
Ophthalmology	William Franklin Hughes
Oral Surgery	Bernard George Sarnat
Orthodontia	Allan Gibson Brodie
Pathology	Granville Allison Bennett
Pedodontics	Maury Massler
Pharmacognosy	Frank Thomas Maher
Pharmacology	Carl Curt Pfeiffer
Pharmacy	Earl Roy Serles
Physical Medicine and Rehabilitation	Herbert Worley Kendell
Physiology	George Earle Wakerlin
Physiology (Clinical Science)	Andrew Conway Ivy
Radiology	Roger Allen Harvey
Surgery	Warren Henry Cole

THE TEACHING FACULTY FOR GRADUATE WORK IN DENTISTRY, MEDICINE, AND PHARMACY

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Bailey, Percival, Ph.D., M.D., Distinguished Professor of Neurology and Neurological Surgery
Bain, James Arthur, Ph.D., Research Associate in Pharmacology
Bennett, Granville Allison, B.S., A.M. (Honorary), M.D., Professor of Pathology, Head of the Department, and Pathologist-in-Chief in the Research and Educational Hospitals
Bergeim, Olaf, Ph.D., Professor of Biological Chemistry
Bessey, Otto Arthur, Ph.D., Professor of Biological Chemistry and Head of the Department
Binkley, Stephen Bennett, Ph.D., Associate Professor of Biological Chemistry
Birch, Carroll LaFleur, M.S., M.D., Associate Professor of Medicine
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Camp, Walter John Richard, Ph.D., M.D., Professor of Pharmacology and Toxicology
Carmichael, Hugh Thompson, C.M., M.S., M.D., Professor of Psychiatry
Catchpole, Hubert Ralph, Ph.D., Assistant Professor of Pathology
Cauldwell, Earl William, M.S., M.D., Assistant Professor of Pathology
Chandler, Fremont Augustus, B.S., M.D., Professor of Orthopaedic Surgery, Head of the Department, and Director of the Illinois Surgical Institute for Children
Cole, Warren Henry, B.S., M.D., Professor of Surgery, Head of the Department, and Surgeon-in-Chief in the Research and Educational Hospitals
Davis, Hugh Leslie, Ph.D., Associate Professor of Chemistry
Davis, David John, Ph.D., M.D., Dean of the College of Medicine and Professor of Pathology, *Emeritus*
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Felsenfeld, Oscar M., M.S., M.D., Professorial Lecturer in Bacteriology
Foley, Edmund Francis, B.S., M.D., Professor of Medicine
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Gershbein, Leon Lee, Ph.D., Assistant Professor of Biological Chemistry
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Gould, R. Gordon, Ph.D., Associate Professor of Biological Chemistry (Rush)
Grossman, Morton Irvin, Ph.D., M.D., Associate Professor of Clinical Science
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Hess, Julius Hays, M.D., Professor of Pediatrics, *Emeritus*
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Hoffman, William Samuel, Ph.D., M.D., Professorial Lecturer in Physiology
Horwitt, Max Kenneth, Ph.D., Assistant Professor of Biological Chemistry
Hughes, William Franklin, Jr., A.B., M.D., Professor of Ophthalmology, Head of the Department, and Ophthalmologist-in-Chief in the Illinois Eye and Ear Infirmary
Ingraham, Raymond Clifford, Ph.D., Associate Professor of Physiology

Ivy, Andrew Conway, Ph.D., M.D., D.Sc., LL.D., Distinguished Professor of Physiology, Head of the Department of Clinical Science, and Vice-President in Charge of the Chicago Professional Colleges

Johnson, Clarence Albert, Ph.D., Assistant Professor of Biological Chemistry

Joseph, Norman Ross, Ph.D., Assistant Professor of Chemistry

Kampmeier, Otto Frederic, Ph.D., M.D., Professor of Anatomy and Head of the Department

Keeton, Robert Wood, M.S., M.D., Professor of Medicine and Head of the Department

Kempf, John Emerson, A.B., M.D., Associate Professor of Bacteriology

Kendell, H. Worley, M.D., Professor of Physical Medicine, Head of the Department, and Chief of Physical Medicine in the Research and Educational Hospitals

Kesel, Robert George, M.S., D.D.S., Professor of Applied Materia Medica and Therapeutics, and Head of the Department

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Lederer, Francis Loeffler, B.S., M.D., Professor of Otolaryngology and Head of the Department; Director of Education (ENT); Otolaryngologist-in-Chief in the Illinois Eye and Ear Infirmary

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Lev, Maurice, B.S., M.D., Associate Professor of Pathology and Associate Pathologist in the Research and Educational Hospitals

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Limarzi, Louis Robert, M.S., M.D., Associate Professor of Medicine

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Munoz, Joaquin, Ph.D., Assistant Professor of Bacteriology

Nedzel, Alexander John, M.S., M.D., Associate Professor of Pathology

Novak, Milan Vaclav, Ph.D., M.D., D.Sc., Professor of Bacteriology, Head of the Department, Assistant Dean of the Graduate College for the Chicago Professional Colleges, and Bacteriologist-in-Chief in the Research and Educational Hospitals

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Pfeiffer, Carl Curt, Ph.D., M.D., Professor of Pharmacology and Head of the Department

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Plagge, James Clarence, Ph.D., Associate Professor of Anatomy

Poncher, Henry George, B.S., M.D., Professor of Pediatrics and Head of the Department

Puestow, Charles Bernard, Ph.D., M.D., Clinical Professor of Surgery

Rappaport, Ben Zion, M.S., M.D., Clinical Associate Professor of Medicine

Reed, Carlos Isaac, Ph.D., Professor of Physiology
Reed, Charles Allen, Ph.D., Assistant Professor of Zoology
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Rostenberg, Adolph, Jr., A.B., M.D., C.M., Associate Professor of Dermatology and Associate Director of Clinical Investigation in the Allergy Unit
Sadove, Max Samuel, B.S., M.D., Associate Professor of Anesthesia and Head of the Division
Sarnat, Bernard George, M.S., M.D., D.D.S., Professor of Oral and Maxillofacial Surgery and Head of the Department
Schiller, Alfred Albert, M.S., M.D., Assistant Professor of Physiology
Schour, Isaac, Ph.D., D.D.S., D.Sc., Professor of Histology, Head of the Department, and Associate Dean of the College of Dentistry in Charge of Postgraduate Studies
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Serles, Earl Roy, Ph.G., Ph.D., Professor of Pharmacy and Dean of the College of Pharmacy
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Shaughnessy, Howard John, Ph.D., Professor of Public Health and Head of the Department
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Unna, Klaus Robert W., M.D., Associate Professor of Pharmacology
Utley, Jean Langley, Ph.D., Assistant Professor of Audiology and Associate Director of the Speech and Hearing Clinic, in the Department of Otolaryngology
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Voigt, Ralph Ferdinand, Ph.D., Associate Professor of Pharmacognosy and Pharmacology and Director of the Drug Plant Experiment Station
Wakerlin, George Earle, Ph.D., M.D., Professor of Physiology and Head of the Department
Webster, George Lewis, Ph.G., Ph.D., Professor of Chemistry and Head of the Department
Weinmann, Joseph Peter, M.D., Professor of Oral Pathology
Welker, William Henry, Ph.D., D.Sc., Professor of Biological Chemistry, *Emeritus*
Whitehorn, William Victor, A.B., M.D., Assistant Professor of Physiology
Zimmermann, Arnold Albert, Dr. ès Sc., Professor of Anatomy

Dental, Medical, and Pharmacy Building

The Graduate College

Location

The Graduate College at the professional colleges of Dentistry, Medicine, and Pharmacy of the University of Illinois is located in the great medical center on the west side of Chicago. The work of the College is centralized in the Dental, Medical, and Pharmacy Building facing on Polk, Wood, and Wolcott Streets. The campus, which is about three miles from the "Loop," or main business district of the city, can be reached conveniently by elevated train, street car, or automobile.

The University buildings contain the administrative offices of the College, the library, several museums, many classrooms and large laboratories for class work, numerous small laboratories for individual research, an autopsy amphitheater, a large and unusually well-equipped surgical amphitheater, auditorium, and the clinics and hospitals. The latter include the Research and Educational Hospitals, the Illinois Surgical Institute for Children, the Illinois Neuropsychiatric Institute, and the Institute for Juvenile Research, which are located on the campus. The Illinois Eye and Ear Infirmary is located near the campus. The Illinois Neuropsychiatric Institute, the Institute for Juvenile Research, and the Illinois Eye and Ear Infirmary are operated jointly by the University and the Department of Public Welfare. The Illini Union Building is at 715 South Wood Street.

History and Organization

The University of Illinois offered facilities for advanced study and research in various lines as early as 1872. Organized graduate instruction, however, under the name of the Graduate School, was first undertaken in 1892. In 1894, the administration of the school was vested in the Council of Administration, and the Vice-President of the University became Dean of the School. In 1906 the Graduate School was organized as a separate faculty. The name was changed to the Graduate College in 1947.

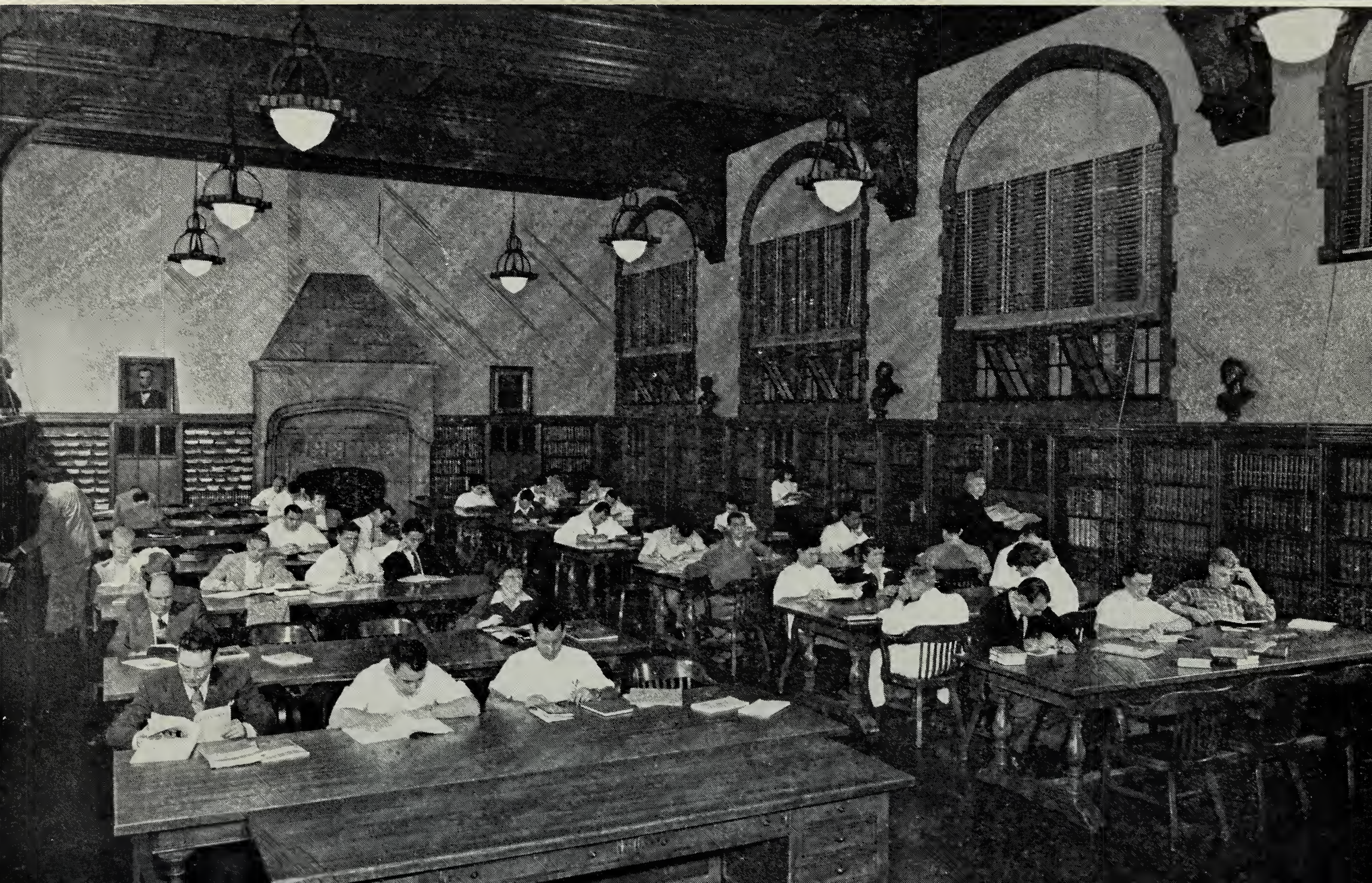
Graduate work at the professional colleges has been in progress since 1924 when the first appointments to the graduate faculty were made. An Assistant Dean is responsible to the Dean of the Graduate College for graduate work conducted at the professional colleges. The teaching faculty includes all members of the University faculty who give instruction in approved graduate courses.

At the professional colleges, graduate college policies as they pertain to graduate work in the medical sciences are determined by the Committee on Graduate Work. Recommendations of this committee concerning graduate faculty appointments and approval of graduate courses and curricula leading to graduate degrees are submitted to the Executive Faculty of the Graduate College at Urbana for approval.

Purpose and Standards

Graduate work in medicine, dentistry, and pharmacy is not intended for individuals seeking brief postgraduate reviews, refresher courses, or demonstrations. Opportunities for this kind of work are available in the postgraduate curricula offered in the professional colleges.

Graduate training is not a matter of successfully completing a number of



advanced courses but chiefly emphasizes original laboratory or clinical investigation. The major requirement for both the Master of Science and Doctor of Philosophy degree is a thesis based on a research problem. Students must devote at least one-half of their time to the thesis. Degrees are granted to students (1) whose level of scholarship and investigative endeavor has proved that they have mastered a definite field of knowledge and are cognizant of its potentialities and opportunities for further advances, (2) who are able to integrate this knowledge with related domains of fact and understanding, and (3) who have proved themselves as independent and original scholarly investigators. The program is primarily one of training for research and teaching in the medical sciences but incidental to such a program is the preparation of individuals for a keen and scientific approach to the conduct of their professional practice or specialty. It is entirely distinct from postgraduate professional training courses.

High standards of admission are maintained and careful selection and individual approval of faculty members is made to supply qualified advisers to graduate students. Laboratory, clinical, and library facilities are superior. Rigid tests in courses and examinations showing evidence of the ability for productive research are requirements for normal progress toward a graduate degree.

Library

The Library of Medical Sciences at the Chicago Professional Colleges ranks as one of the largest university medical libraries in the United States with a total of 90,000 volumes, of which two-thirds are bound periodicals. The library is now receiving 925 current periodicals. The book collection is on open shelves, and there are no restrictions concerning the use of the stacks. The library is used not only by staff members and students of the University, but by other medical schools, hospitals, and professional men and women throughout the Chicago area. Interlibrary Loan Service permits extensive loan service with other libraries in the country and is of great value to the research worker.

Reference collections in the library include the important American and English encyclopedic works; German *Handbücher* for most of the medical fields; scientific and technical language dictionaries; periodicals covering not only medicine, dentistry, and pharmacy, but allied sciences as well; indexes; sets of abstracts; and pharmacopoeias, both American and foreign.

Museums

The College of Dentistry has a museum of dental anatomy and comparative odontology containing 1,500 specimens.

The College of Medicine has the Anatomy Museum, including gross anatomy, histology, embryology, and neurology, and the Pathology Museum, including general, special, and medico-legal specimens.

The College of Pharmacy has a museum including more than 10,000 specimens of crude drugs and technical products. One collection is classified according to botanical origin and is arranged in cases illustrating habitat, commerce, etc. Another collection contains every drug officially listed in the *United States Pharmacopoeia* since 1820 and in the *National Formulary* since 1888.

Recreational Facilities

The social and recreational center for students, alumni, and faculty members is the Chicago Illini Union Building, 715 South Wood Street. Its facilities include a cafeteria, grill, soda fountain, browsing room, music room, gymnasium, meeting rooms, and game rooms. Intramural sports under a trained director are encouraged, and facilities and equipment are available for softball, touch football, horseshoes, tennis, archery, wrestling, fencing, badminton, basketball, handball, and ping-pong. Through special arrangements, the swimming pools of the nearby Y.M.C.A. and Y.W.C.A. are available to students. In winter the cement tennis courts are flooded for ice skating.

Hospital Facilities for Research

The Research and Educational Hospital, planned and built for teaching and investigation, with 400 beds, connects directly with the classrooms and laboratories of the College. Each year nearly 6,000 patients are admitted. The obstetrics department handles approximately 1,000 patients annually, seventy per cent in the hospital and the remainder at home. There are seven surgical operating rooms, all with facilities for students, including a large amphitheater, seating nearly 200, completely equipped for all types of surgery. There is also a well-equipped cancer clinic with a 400,000-volt therapeutic X-ray machine and an adequate supply of radium. The entire hospital is constantly in use for teaching and research.

The Illinois Surgical Institute for Children, commonly called the Orthopaedic Institute, has beds for 130 patients. The Neuropsychiatric Institute has two separate divisions, one for neurological and one for psychiatric cases. Provision has been made for teaching in all sections, including outpatient service, wards, and a combination operating and lecture room. Extensive research facilities are also provided.

Under an agreement made in 1941, the Presbyterian Hospital, a neighboring institution with 450 beds, became affiliated with the University of Illinois. Members of its staff, who formerly were on the staff of Rush Medical College of the University of Chicago, were added to the faculty of the College of Medicine.

The administration of the Illinois Eye and Ear Dispensary, with 120 beds, has been transferred to the University of Illinois. The very extensive facilities thus made available are used primarily in specialty and graduate training.

The Division of Services for Crippled Children is an independent unit of the University operating a state-wide program of medical, surgical, corrective, and other services and facilities for diagnosis, hospitalization, and aftercare for children who are crippled or who are suffering from conditions which lead to crippling.

Admission

While the graduate program is intended primarily for students who have received their professional degrees in medicine, dentistry, or pharmacy, superior students currently registered in a professional college curriculum or who have essentially completed premedical requirements and have a bachelor's degree may be accepted on a highly selective basis if their interests indicate a desire for training at the graduate level in basic medical sciences and an intention to make teaching, research, or laboratory service in one of these branches a lifetime endeavor. Because of heavy enrollment not all applicants from this latter group can be admitted. Inquiries should be directed to the Graduate College office, Room 384, 808 South Wood Street, Chicago 12, Illinois.

Admission to the Graduate College is granted to graduates of institutions whose requirements for the professional or bachelor's degree are substantially equivalent to those of the University of Illinois. Applicants must have a scholastic average of at least 3.5, or its equivalent on the University of Illinois scale,[1] in their undergraduate work in order to qualify for admission. For medical or dental students, the average is based on pre-professional and professional school grades. In certain cases an individual whose record or training is outstanding in one or more lines of endeavor and whose general average does not meet the required 3.5 minimum may be considered by the Graduate Committee for admission if a written petition is presented by the head of the department in which the applicant desires to conduct work. In all such cases, admission is on special status and may be terminated at any time if the progress of the student is unsatisfactory. A student originally admitted on special status shall, upon completion of a full quarter of satisfactory work (three units of A or B), be transferred to full status.

Admission to graduate courses is granted only to persons who have had the requisite undergraduate work. Admission to the Graduate College does not imply admission to candidacy for an advanced degree, and gives no right or claim to be so admitted; a mere accumulation of "credits" or "grades" is not sufficient.

Application blanks for admission may be secured from the Assistant Dean of the Graduate College, 384 Dental, Medical, and Pharmacy Building, 808 South Wood Street, Chicago 12, Illinois. Each applicant must submit with his application for admission an official transcript of his college record. After approval by the Examiner and Recorder, the application is forwarded to the head of the department for acceptance. If accepted, he is notified and assigned to an adviser and may register for courses approved by his adviser. Final admission is dependent on his passing a physical examination conducted by the University Health Service.

Curricula in postgraduate studies in professional fields are not a part of the Graduate College and all inquiries on such curricula and refresher courses should be directed to the dean of the professional college in which the work is to be taken (Medicine or Dentistry).

Applicants for graduate work not specifically related to work in the medical sciences should consult the general Graduate College catalog. Copies may be obtained from the Dean of the Graduate College, 105 Administration Building (East), University of Illinois, Urbana, Illinois.

Registration and Program of Studies

Registration. Each graduate student must register at the beginning of each quarter. The registration of a new student may be accepted at any time provided the student is prepared to take up courses actually under way for credit reduced in proportion to the length of time which has elapsed since the beginning of the course. Credit towards the fulfillment of the residence requirement dates, however, from time of registration and not from the beginning of the quarter or year in which the student enters. Registration for courses requires the signature of the instructor involved and the major adviser. The number of units for which the candidate registers is determined on the basis of thirteen hours of laboratory work or its equivalent per week for one unit of credit. One-half unit may be taken as the minimum per quarter and three units constitute a full program.

The first registration, or that on entrance, is permitted only after the student's application for admission to the Graduate College, setting forth his educational attainments, has been duly approved and he has been accepted by a department which offers a curriculum leading to a Graduate College degree. Evidence of acceptance may be obtained at the Graduate College office after due time has been allowed for processing the application.

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[1] Averages are computed on the following basis: A = 5; B = 4, C = 3, D = 2; E (failure) = 1.

After a student has been accepted he can obtain the registration forms in the Graduate College office and be informed as to his assignment to a major adviser who will discuss with the student his program of study and research during the period of residence in graduate work. After obtaining the signature of the major adviser, the student will obtain signatures of the individual instructors for each course. The registration forms are then submitted to the Assistant Dean of the Graduate College for approval.

Registration, including the payment of fees, must be completed by the close of the registration days of the Graduate College. A fee of $5 will be charged of former University of Illinois students for late registration.

Medical Students and Graduate Study. At the beginning of the second quarter of his second year in medicine, a student who has a bachelor's degree, has been in residence for one year, and has maintained an 85 per cent average in the College of Medicine may be permitted to register for two-thirds unit per quarter. Only students of excellent record will be allowed this privilege. Registration may continue in following quarters as long as an 85 per cent average is maintained in the medical curriculum.

Medical students who take advantage of this opportunity become familiar with the methods of research and advanced study and are granted credit by several specialty boards for the basic science time credit requirement.

Changes in Registration. A graduate student is expected to plan his work so carefully that changes in his study-list during the quarter will not be necessary. When a change seems advisable, however, it may be permitted, if approved by the major adviser, the instructors involved, and by the Assistant Dean of the Graduate College. It will be permitted without fee if completed within ten days of the date of registration after which $1 is charged for each change. A student is not allowed to withdraw from a course after the term is half finished if his grade in that course is C or below. Exceptions may be made by the Assistant Dean in cases of illness or adversity.

Students on the Staff. Assistants and others on the University staff who undertake to do graduate work are permitted to take an amount of work determined by the terms of their employment as follows:

Full-time employment	1 unit
Three-quarter time employment	1½ units
One-half time employment	2 units
One-quarter time employment	2½ units

Assistants and others on the University staff whose terms of employment do not apply during the summer quarter may register for a full-time graduate program of three units.

Staff members having professorial rank are not allowed to register for work toward advanced degrees without special approval by the Dean of the Graduate College.

Students classified as fellows are allowed to register for a full-time program of three units on the basis of the rules regarding fellows which specify that all of the student's time is available for research and no routine duties can be required of him.

Graduate Study in the Summer. A full term of work is available during the summer quarter. Students in the professional colleges during the fall, winter, and spring quarters may register for full-time graduate work during the summer provided they can qualify for admission.

Time Limit for Completion of Degree. Work toward the Master of Science degree must be completed within five years and for the Doctor of Philosophy degree within six years from the date of first registration in the Graduate College.

Withdrawal. If a student wishes to withdraw from any course or to add other work, he must first secure the necessary blank from the office of the Assistant Dean. If he wishes to withdraw from the University, he must also get clearance papers at this office. A student is not permitted to withdraw from a course after the term is half finished if his grade in that course is C or below, unless he is willing to accept a grade of E therein. Exceptions may be made when justified.

Grades. Student's work is graded in five classes: A, B, C, D, and E. The last indicates a failure, C or D indicates unsatisfactory, though passable work. A student who receives two units of a grade below B must complete two additional units of A or B grade to qualify for a degree. Three units of a grade below B disqualifies a student for further work at the graduate level.

A failure or absence from an examination in any course in the major field precludes the conferring of the degree in the year in which the failure occurred.

Attendance at Commencement Required. Unless excused by the Assistant Dean of the Graduate College, candidates for graduate degrees are required to attend Commencement exercises.

The Degree of Master of Science

Candidates for the degree of Master of Science are required to do at least three quarters of work in residence. Three units constitute a normal quarter program for a master's degree and a minimum of nine units must be completed for the degree. A thesis is required. Only superior students are permitted to secure a degree with this minimum program. In all cases, the student must satisfy the departmental requirements of his major department and major adviser. At least four units must be earned in research courses.

Residence Requirements. Unless consent has been obtained from the Committee on Graduate Work, all work must be conducted at the University. Petitions for extramural graduate work are made to the Assistant Dean and approved by the Committee on Graduate Work. Such requests must be justified on the basis of better facilities which are not available at the professional colleges. The adviser, in such instances, must assume responsibility for the work and make recommendations upon its completion regarding credit and grades to the Assistant Dean of the Graduate College.

A graduate student who has done graduate work in other approved institutions may obtain credit not exceeding three units toward the master's degree if recommended by the department head and approved by the Committee on Graduate Work. In such instances the department head must be satisfied that the work is equivalent to the level of graduate courses offered by the University of Illinois. A student securing advanced credit by this means must, nevertheless, fulfill the general residence requirement of three quarters.

Majors and Minors. A candidate for a master's degree may do all his work in one subject, or he may select a major and one minor. A major or a minor denotes the field of knowledge of a department or such part thereof as constitutes a separate and independent division of that field. For a master's degree, a major represents work totaling a minimum of four units. Less than two units may not be counted as satisfying the requirements of a minor.

Foreign Language. The ability to use one or more of the modern languages ordinarily studied in the undergraduate curriculum is desirable for all candidates for the master's degree and is required by some departments. No student will be permitted to acquire residence toward the doctorate until he has passed the examination in at least one of these languages.

Master's Thesis. Each candidate for a master's degree is required to present a thesis on some subject approved by the professor in charge of his major work. Such approval must be secured and the subject of the thesis filed at the office of the Graduate College not later than the beginning of the third quarter of residence.

Thesis Work in Absentia. A student may be permitted to complete the last two units of his work, if devoted to his thesis, under leave of absence. To receive such permission, the student must have secured proper credit for at least seven units in residence, must petition for the privilege and submit to the Committee on Graduate Work an outline of the proposed investigation approved by the head of his major department, and must submit satisfactory evidence that adequate facilities are available to him at the place where he intends to do the proposed work. Approval on all these points must be obtained. The student must register and pay the same tuition fee as a regular student in residence.

Publication of Thesis. The subject material of a master's thesis may be published. Publication is encouraged and does not require prior approval of the Assistant Dean.

Directions for Thesis Preparation. Specific printed instructions for the preparation and form of the thesis are available at the Graduate College office. Special thesis paper is required and title pages and envelopes must be printed. Two copies of the thesis in its final form are submitted at any time during the year. It must be in before the deadline indicated on the calendar if the student is to receive his degree in June.

Oral Examination. Upon deposit of the thesis, a committee is appointed by the Assistant Dean to examine the candidate's thesis and to determine his knowledge in the major (and minor) field of study. The committee may recommend the student to the Assistant Dean for the degree indicated at least two weeks before the date set for Commencement exercises. Degrees are conferred at the June Commencement.

Applications for Degrees. Each candidate for the degree of Master of Science shall file an application for the degree on a blank provided for the purpose. For the dates of application and deposition of theses, consult the calendar.

The Degree of Doctor of Philosophy

Admission by Qualifying Examination. Students desiring admission to graduate study beyond the Master of Science degree must file application with the Assistant Dean. No student will be admitted without the recommendation of a committee of three appointed by the Assistant Dean to interview the prospective student and conduct a qualifying oral examination and to pass upon an outline of his Doctor of Philosophy program as prepared by the student's major adviser.

Period of Study. The normal minimum period of study required for the degree of Doctor of Philosophy is two years beyond the master's degree during which the student is required to devote all his working time to his studies. Both years must be spent in residence at some accredited educational institution. If the student has obtained his Master of Science degree at the University of Illinois, one of the two may be spent in absentia if approved by the Committee on Graduate Work. The degree is conferred, however, not for residence during a certain period, but for scholarly attainments and power of investigation, as proved by a thesis and examination.

Major and Minor Subjects. A student who desires to become a candidate for the degree of Doctor of Philosophy is required to earn a total of eighteen units beyond the master's degree, nine units of which must be in research courses. He must pursue a major subject in the department in which his research lies. He is also required to choose one minor subject, or he may choose two. If one minor only is chosen, it must be taken in a department of study other than that of the major, and credit for it may be earned by work representing not less than four units. If two minors are chosen, one must be a subject closely related to the major. With the approval of the adviser, it may be a division of the major field of study. The other minor (not less than two units) must, in that case, be taken in a department of study other than that of the major. Units earned in the minor field while pursuing work toward the Master of Science degree may be counted in the total required for a minor. A student whose major is in a clinical department must select a minor in a basic science and heads of those departments or their representatives shall act as co-advisers to the student. Not more than two units of a minor shall consist of work in research courses (493).

The preliminary examination in major and minor subjects may not be taken until the minor work and language requirements have been completed.

Preliminary Examinations. A candidate for the Doctor of Philosophy degree must submit to a preliminary examination intended to test his knowledge of the fields of his major and minor subjects and to determine whether he is prepared for the final year of work for the doctorate. It extends to the whole field of study of the candidate. It will not be confined to the field covered by the courses specifically taken in this or other universities. It will be conducted to determine whether the candidate has a satisfactory grasp of his major and minor and a general acquaintance with the fields of knowledge represented by his course of study. Familiarity with those phases of the medical sciences essential to proficiency in the student's major is required. It is partly oral, but may be wholly so.

The student will not be admitted to his preliminary examination until (1) he has passed the two required foreign language examinations, (2) he has satisfactorily completed nine units of work beyond his master's degree, and (3) his adviser recommends to the Assistant Dean that he is adequately prepared for the examination. He must complete nine units of graduate work between his preliminary examination and the completion of his work for the doctorate.

Final Examination. About two weeks before the time when the degree is conferred, the candidate must submit to a final examination given by a committee appointed by the Assistant Dean. This examination is primarily on the research work of the student as embodied in his thesis but is not confined to that and is intended to verify that the candidate has a satisfactory grasp of his major subject as well as an acquaintance with the field of knowledge pertaining less directly to it.

If, after having passed his preliminary examination, he fails in the third year of his study to meet the expectations of the professors in charge of his work or in any way fails to maintain the standard of scholarship and power of research expected of him, he may be refused admission to the final examination.

Other Examinations. Before the candidate is admitted to the final examination and defense of his thesis, he may be required to take any other examination, oral or written, which is thought proper by the various departments in which he has studied.

The above examinations are in addition to those in the courses for which the student is registered. These must be taken at the times for which they are set by the major adviser.

Thesis. The power of independent research must be shown by the production of an original thesis on some topic connected with the major field of study. The candidate is expected to defend his thesis or dissertation before the members of the faculty, or as many of them as may wish to question him about it, in connection with his final examination.

The subject of the thesis should be chosen and the title submitted to the Graduate College office not later than the first registration following successful completion of the preliminary examination.

Two typewritten copies of the complete thesis on thesis paper and in final form with title pages, envelopes, and certificate of approval, must be deposited in the office of the Graduate College for presentation to the examining committee not later than two weeks prior to the final examination, and not less than four weeks before the time when the degree is conferred (see Calendar). The style and form of the thesis must comply with the printed instructions obtainable at the Graduate College office.

The candidate who sustains the final examination must satisfy the publication requirements by one of the methods described below:

(1) No later than one week before Commencement, the candidate must deposit with the Graduate College one hundred printed copies of the essential part, or an abstract, or digest of his thesis, indicating the method followed, the evidence used, and the conclusions reached in the investigation. A Certificate of Approval signed by the major adviser must accompany these abstracts or be on file at the Graduate College.

(2) If the candidate expects to have his thesis accepted for publication in its entirety or in an abbreviated form by a standard journal or publisher within a year from the date of his graduation, he may pay the cashier $75 and at the same time deposit with the Graduate College an abstract of his thesis (and the Certificate of Approval) in a condition for publication at a cost not to exceed $75.

If the thesis is accepted for publication within the year, one hundred reprints may be deposited at the Graduate College when they are available. The Graduate College will have the reprints bound with the required covers, title page, and vita, these charges being deducted from the $75 deposit. The balance of the deposit will be refunded.

If the thesis is not accepted within the year, the University will print one hundred copies of the abstract for distribution and the deposit will not be returned.

(3) The candidate may choose to have his thesis microfilmed by an approved microfilming service.

The Candidate who elects this service must advise the Graduate College of his intention when he deposits his thesis or when he obtains his clearance paper. He will pay the cashier $35 and will deposit with the Graduate College office the original and first carbon of his thesis and one copy of an abstract of six hundred words or less.

The Graduate College will make arrangements with the microfilming service to: (1) microfilm the thesis and obtain one positive print for the University Library; (2) print the abstract in the next issue of an abstract journal to be distributed to leading libraries here and abroad; (3) catalogue the manuscript and print and distribute library cards in accordance with the Library of Congress procedures; (4) obtain copyright protection in the name of the author.

The $35 fee is a payment for these services; it is not a deposit, and no refunds will be made to the student.

Application for Degree. Each candidate for the Doctor of Philosophy degree shall file an application for the degree on a blank provided for that purpose. Application is made at the time the thesis is submitted in final form to the Assistant Dean.

Fellowships

An individual on fellowship appointment shall be registered in the Graduate College carrying on a program of academic study and research leading to a graduate degree. Payments made to the individual are not for definite services performed for the University but are to provide living expenses while the approved course of study or research is being pursued. Fellows must devote full time to such activities and no teaching, proctoring, grading of papers, or other routine duties shall be required of them.

Graduate College Research Fellowships. Ten research fellowships are awarded annually in the fields of dentistry, medicine, and pharmacy at stipends of $1,200 for pharmacy graduates and $1,800 for medical and dental graduates for the calendar year and with exemption of tuition fees. In certain cases a stipend of $2,400 may be awarded to those holding a doctor's degree. Fellows are eligible for reappointment in competition with new applicants. Registration for full-time graduate work is required. Fellowships provide an opportunity for research training in the basic sciences or in the application of these sciences to clinical investigation. They are intended primarily for graduates who are in the early stages of their preparation for a teaching and research career.

Candidates must have completed a minimum of training in any one of the following ways or the equivalent thereof: (1) bachelor's and M.D. degree, (2) bachelor's and D.D.S. degree, (3) bachelor's degree in pharmacy and M.S. degree. Eligibility for Graduate College admission is a prerequisite for fellowship appointment.

Formal application forms are obtainable from the office of the Assistant Dean. Applications must be in by February 15 for appointments to become effective on July 1 or September 1. Applications should be mailed to the Assistant Dean of the Graduate College, Room 384, 808 S. Wood Street, Chicago 12, Illinois.

Fellowships in Pharmacy. One Walgreen graduate fellowship of $1,000 for work leading to the degree of Doctor of Philosophy in Chemistry or Pharmacognosy is offered annually by the Graduate College through the College of Pharmacy. No teaching or technical services are required. Candidates for this fellowship should possess a Master of Science degree, preferably in some field of pharmaceutical endeavor, a reading knowledge of German and French, and should have demonstrated an ability to conduct independent research.

In addition to the above, the American Foundation for Pharmaceutical Education, 330 West 42nd Street, New York 18, New York, offers support in the nature of a stipend and payment of tuition to selected students who may choose to conduct their graduate work at the University of Illinois. Applications are made directly to the Foundation.

Federal Fellowships. Attention of all graduate students is also directed to fellowship support offered by federal agencies such as the National Research Council, Washington 24, D.C., and the National Institute of Health, Bethesda, Maryland. A student should apply directly to those agencies and may obtain approval to conduct his work at the University of Illinois if accepted as a graduate student.

Assistantships

A number of departments offer half-time assistantships carrying an annual stipend of $1,200. Assistants are required to perform services for the University in the nature of grading papers, proctoring, and assisting in laboratory teaching or research. Appointments to this classification are also made for research assistants designated for a specific research project supported by outside funds. Exemption from tuition is provided if the salary falls below the minimum stipulated by the University.

Applicants should apply directly to the department head after ascertaining their eligibility for graduate work. Assistants must carry a reduced study schedule as indicated on page 20 of this catalog but the greater length of time required to complete the degree is compensated by the additional gain in teaching and research experience.

Fees

Students in the Graduate College are subject to the regulations governing fees for each of the following:

Tuition Fee. The tuition fee in the Graduate College is $12 per unit for residents of Illinois, or $24 per unit for nonresidents.

Laboratory, Library, and Supply Fee. A fee of $5.50 per quarter is charged all students.

Illini Union Service Charge. All students registering for resident work, except those who are members of the University staff and others who are registered for not more than one unit of graduate work, are assessed each quarter an Illini Union service charge of $3.50.

Late Registration Fee. Former students who register after the regular registration days in any quarter pay a late registration fee of $5.

Change of Study-list Fee. For every change issued later than noon on the tenth day following the regular registration date, the fee is $1.

Transcript Fee. Each student who has paid all the University fees is entitled to receive, without charge, one transcript of his record. For each additional transcript, the fee is 50 cents.

Service Charge for Deferred Fees. A service charge of ten per cent of the amount of fees deferred, but not to exceed $2 a quarter, is assessed for the privilege of deferring fees. If deferred fees are paid in full within ten days after registration, the service charge is refunded except that a minimum service charge of $1 is retained by the University in all cases. The service charge for deferring fees and all charges from previous quarters must be paid on the day of registration.

Fees for Persons on the University Staff. Persons on the academic and administrative staffs of the University in any capacity, or on fellowship appointment in the Graduate College, or on permanent employment on the nonacademic staff may register in University courses for which they are eligible for admission without payment of the tuition fee and the laboratory fee, provided their annual salary is at the rate of $2,934 ($266.66 a month) or less for full-time employment. (Nonacademic employees must secure the approval of the head of their department or division and the Nonacademic Personnel office.)

Thesis Deposit Fee. Candidates for the Doctor of Philosophy degree, see previous section on thesis deposit (page 24).

Fields of Instruction

Courses open to graduate students are of two classes. Those numbered from 300 to 399 are open to advanced undergraduate and graduate students. Those numbered 400 and above are open to graduate students only.

Many courses for graduate students require some measure of previous preparation. A student who wishes to enter a particular course must satisfy the department concerned that he has had, either at the University of Illinois or elsewhere, the necessary preparation for admission to the course.

The credit value of graduate courses is given in units. Quarters in which courses are taught are indicated by F, W, Sp, or S representing fall, winter, spring, and summer, respectively.

ANATOMY

The Department of Anatomy offers graduate study leading to the degrees of Master of Science and Doctor of Philosophy.

The general requirements for admission for work toward the Master of Science degree must be met including final approval by the department head. Candidates with the Bachelor of Science or Bachelor of Arts degree or with the Master of Science degree (in zoology, for example) who have not yet taken the anatomical courses of the first year of the medical curriculum or its equivalent shall register for courses 401, 402, 403, 404, 405, 406, and 407 before obtaining permission to enroll for substantial work in course 493. Students in this category will not find it possible to earn the master's degree in anatomy in less than two academic years. Applicants with the Doctor of Medicine or Doctor of Dental Surgery degree who in their training have completed all of the anatomical courses of the medical curriculum or their equivalent are not required to take any of the above didactic courses (401 to 407) unless the major adviser should deem it advisable and may register directly in course 493. A thesis based on original research is required of all candidates.

For the candidate for the degree of Doctor of Philosophy, the general regulations pertaining to admission, period of study, grades, examinations in languages, preliminary and final examinations, and thesis work are enforced. No additional course work is required in the major except course 493. Research for the thesis may be conducted in any of the following areas: embryology, cytology, histology, organology, neuro-anatomy, physical anthropology and biometrics, experimental morphology, functional and applied anatomy. Minors may be taken in biochemistry, physiology, bacteriology, pathology, pharmacology, or exceptionally in other departments depending on the needs and objectives of the student. During the course of training toward the Doctor of Philosophy degree, provision is made for the candidate to gain teaching experience in the various branches of anatomy.

Graduate Teaching Faculty

Professor and Head of Department: Otto F. Kampmeier, Ph.D., M.D.
Professors: Arnold A. Zimmermann, Dr. ès Sc., Gerhardt von Bonin, M.D., Parke H. Simer, Ph.D.
Associate Professors: Robert H. Krehbiel, Ph.D., James C. Plagge, Ph.D.

Courses for Graduates

401. Gross Anatomy: Anatomy of the Extremities. Regional and systematic dissection of the human body, with emphasis on comparative, functional, and applied considerations. Laboratory work and conferences. F; 1 unit.
402. Gross Anatomy: Anatomy of the Thorax, Abdomen, and Pelvis. Regional and systematic dissection of the human body, with emphasis on comparative, functional, and applied considerations. Laboratory work and conferences. W; 1 unit.
403. Gross Anatomy: Anatomy of the Head and Neck. Regional and systematic dissection of the human body, with emphasis on comparative, functional, and applied considerations. Laboratory work and conferences. Sp; 1 unit.
404. Cytology and Histology: The Cell and Fundamental Tissues. Study of the morphology and functions of cells, the classifications, differentiations, and actions of tissues and the microscopic anatomy of organs; cytological and histological techniques. Laboratory work and conferences. F; 1 unit.
405. Cytology and Histology: Organology. Study of the morphology and functions of cells, the classifications, differentiations, and actions of tissues and the microscopic anatomy of organs; cytological and histological techniques. Laboratory work and conferences. W; 1 unit. Prerequisite: Anatomy 404.
406. Embryology. Emphasis on human developmental anatomy; considerations of comparative and experimental embryology; general embryology (germ cells, fertilization, cleavage, germ layers, etc.); organogeny (morphogenesis and histogenesis); special embryology (fetal membranes, placentation, etc.); teratogeny; fetal anatomy; postfetal growth, regeneration, etc.; techniques of embryological study. Laboratory work and conferences. F; 1 unit.
407. Neuro-Anatomy. Anatomy and function of the different parts of the human nervous system; considerations of ontogenesis, phylogenesis, and comparative neurology; meninges and blood vessels; morphology of the sense organs; internal organization, nuclei, and fiber tracts of the central nervous system; autonomic nervous system; techniques of neurological study. Laboratory work and conferences. Sp; 1 unit.
491. Seminar in Anatomy. Critical reviews of recent anatomical literature; presentation and discussion of the results of individual investigations. F, W, Sp; ¼ unit. Attendance and participation of all graduate students majoring in anatomy is required.
493. Research in Anatomy. In one or more of these divisions: embryology, cytology, histology and organology, neuro-anatomy, physical anthropology and biometrics, experimental morphology, functional and applied anatomy. F, W, Sp, S; ½ to 3 units.

APPLIED MATERIA MEDICA AND THERAPEUTICS

Investigative work conducted in the Department of Applied Materia Medica and Therapeutics is essentially an application of fundamental basic science to clinical practice. Graduate students whose research is directed along these lines may apply for acceptance as graduate students in a basic science department and apply the results of their investigative effort in this department toward their thesis. Graduate College degrees are not offered specifically in Applied Materia Medica and Therapeutics.

Graduate Teaching Faculty

Professor and Head of Department: Robert G. Kesel, M.S., D.D.S.

Courses for Graduates

401. Advanced Therapeutics. F, W, Sp, S; 1 or 2 units.
493. Research in Therapeutics. F, W, Sp, S; 1 or 2 units.

BACTERIOLOGY

The plan for graduate training of bacteriologists at the professional colleges, while it does emphasize the medical, dental, and pharmacy aspects, recognizes the fact that fundamental work in the whole field of bacteriology is essential to a concrete approach to the many unsolved problems in the field. Proper background in chemistry, including biological chemistry, biometrics, and physiology, is a definite asset to an understanding of the biology of bacteria and their interrelationships to other living things. While investigative work frequently follows medical lines, students are required to encompass the entire field of bacteriology including the related microorganisms such as the viruses, fungi, and rickettsia, and the immunological, physiological, and biochemical principles which involve each group. A broad knowledge of the field is required; specialization in virology, mycology, or immunology is chiefly incidental as it pertains to the student's research effort and thesis.

The program recognizes that graduate degrees at the professional colleges are degrees representing proficiency in research endeavor. It is dedicated to achieve the following objectives: (1) training for future careers in medical research and teaching, (2) training of bacteriologists in the fundamental and applied techniques in diagnostic work, and (3) training of investigators suitable for research positions in industry especially those involved in the development of new biologicals and antibacterial agents.

Applicants are considered in the order of the qualifications presented. Students having the Doctor of Medicine or Doctor of Dental Surgery degree, or currently pursuing these degrees, are given preference. Minimum requirements are those that apply to all applicants for graduate work in the professional colleges, namely completion of the premedical curriculum, a bachelor's degree, and a minimum grade-point average of 3.5. Selections are made from applicants who have the best backgrounds as determined by action of a departmental committee. Selection of applicants for work for the Doctor of Philosophy degree are made from those who have obtained master's degrees in the department except in very exceptional cases.

To secure a firm foundation in bacteriology the student is required to take certain courses and urged to attend various seminars in other departments and to do systematic reading and study.

For the Master of Science degree, Bacteriology *320*, *325*, and 491 are required. Four units must be earned in course 493, and three units in other bacteriology courses in the 400 group. A student who anticipates applying for work toward the Doctor of Philosophy degree must first complete Biological Chemistry 301 and Pharmacology 401.

For the Doctor of Philosophy degree, a minimum of ten units of didactic course work including those applied to the Master of Science degree are required. Suggested courses include Physiology *324*, *325*, *326*, Dermatology 401, and Chemistry 409, 410. At least nine units must be in research courses. Four units in a suitable minor as approved at the time of the qualifying examination is required. The usual Graduate College requirements which apply to all students at this level of training shall apply.

Graduate Teaching Faculty

Professor and Head of Department: Milan V. Novak, Ph.D., M.D., D.Sc.
Professor: Howard J. Shaughnessy, Ph.D.
Associate Professor: J. Emerson Kempf, M.D.

Assistant Professors: George F. Forster, Ph.D., Sol R. Rosenthal, Ph.D., M.D., Joaquin Munoz, Ph.D., Esther Meyer, Ph.G., Ph.D.
Lecturer: Oscar Felsenfeld, M.D.

Courses for Graduates

320. Bacteriology and Related Microbiology. A study of the general morphology, metabolism, serology, and pathogenity of the important microbial agents of communicable diseases; action of germicidal agents, sulfonamides, penicillin, streptomycin, and other antibiotics; factors in parasitic offense, and mechanisms of host defense; detailed consideration of pathogenic cocci. Two lectures and four hours laboratory each week. Sp; ⅔ unit.

325. Bacteriology and Related Microbiology. Continuation of course 320. Detailed consideration of intestinal pathogens, water and milk sanitation, anaerobes, viruses, pathogenic fungi, protozoa, spirochaetes, rickettsia, and other microbial agents of disease; serological methods and routine hospital laboratory procedures applicable to diagnosis of communicable diseases. Three lectures and six hours laboratory each week. F; 1 unit. Prerequisite: Bacteriology 320 or general bacteriology.

401. Cytology and Metabolism of Microorganisms. Bacterial structure as it is related to function and biochemical activity of the cell; influence of germicides, antibiotics, and other substances on the morphology and metabolism of bacteria; nature of bacterial respirations. Sp; 1 unit. Prerequisite: General bacteriology; biological chemistry.

402. Immunology. A course designed to teach the general principles of serological reactions, preparation of biologicals, production of the immune condition in animals, demonstration of the cellular mechanisms of immunity, the allergic response, blood groups, forensic serological tests, and practical diagnostic methods based on serological and cutaneous reactions. W; 1 unit. Prerequisite: General and medical bacteriology.

403. Virology. Lectures and laboratory work on the nature of viruses, their physical, chemical, and biological characteristics; methods for propagating them in the laboratory; technique of isolating viruses; purifying, concentrating, and observing them on the electron microscope; identification by laboratory procedures; preparation and testing of vaccines. F; 1 unit. Prerequisite: General and medical bacteriology.

404. Medical Mycology. A general survey of fungi with special reference to the pathogenic groups causing both superficial and deep mycotic infections. Two lectures and six hours laboratory each week. Sp; 1 unit.

491. Seminar and Literature Review. Presentation of timely subject material and individual research contributions. Each student is required to present one seminar each quarter. Required of all graduate students. F, W, Sp; ½ unit. Prerequisite: General bacteriology.

493. Research in Bacteriology. Individual research in the field of bacteriology, including allied subjects usually included under this title such as virology, immunology, mycology, and protozoology. F, W, Sp, S; 1 to 3 units. Prerequisite: General and pathogenic bacteriology.

BIOLOGICAL CHEMISTRY

The objectives of the Department of Biological Chemistry in offering graduate training are (1) to develop teachers of the subject for colleges of medicine, dentistry, and pharmacy, (2) to develop investigators in this field and the allied biological sciences, (3) to aid in providing an environment in better teaching of professional students in the medical sciences in the University of Illinois, and (4) to aid the academic staff in the department in obtaining new knowledge through research endeavor.

The admission requirements are those in general which apply to all applicants for graduate work at the professional colleges. More specifically stated, the undergraduate training must include the following minimum requirements: sixteen semester hours of chemistry, including organic, quantitative analysis, and physical chemistry; eight semester hours of physics, including laboratory work in electricity, heat, mechanics, and sound; ten semester hours in biology, including general and vertebrate zoology or comparative anatomy; six semester hours of a modern language, either German or French. Students having a bachelor's degree, including the above minimum course requirements, as well as medical and dental graduates or students pursuing these professional degrees are eligible to apply for graduate work in the department. Candidates for the Master of Science degree in Biological Chemistry are required to take the following courses: Biological Chemistry 301, 491, 493, Anatomy 404, 405, and either Physiology 324 and 325 or Bacteriology 320, 325, 402. A total of four units must be earned as a minimum in Biological Chemistry 493.

Candidates for training beyond the degree of Master of Science shall have earned this degree or met the requirements for this degree in the Graduate College or completed work of equivalent value elsewhere. The following course requirements, in addition to those already completed for the Master of Science degree as listed above, shall include courses in advanced biological chemistry, courses in advanced organic chemistry or advanced physical chemistry to be taken either on the professional colleges campus or on the Urbana campus or elsewhere as determined by the head of the department. In addition to the above, Pharmacology 325 is required. Completion of the following courses are required toward the minor: Physiology 324, 325, Bacteriology 320, 325, 402, 403.

The thesis requirement must conform to the general requirements of the Graduate College and in addition must be of such merit as to warrant publication in full or in part in a recognized chemical journal.

Due to limited facilities in the department, students are accepted in the order of qualification for both Master of Science work and Doctor of Philosophy work.

Graduate Teaching Faculty

Professor and Head of Department: Otto A. Bessey, Ph.D.
Professors: William H. Welker, Ph.D. (Emeritus), Olaf Bergeim, Ph.D., Douglas A. MacFadyen, A.M., M.D.
Associate Professors: R. Gordon Gould, Ph.D., Stephen B. Binkley, Ph.D.
Assistant Professors: Max K. Horwitt, Ph.D., Clarence A. Johnson, Ph.D.

Courses for Graduates

301. Biological Chemistry. Chemistry of the constituents of tissues and body fluids, and current methods for their qualitative and quantitative determination; digestion, absorption, and intermediary metabolism of lipids, proteins, and carbohydrates in health and disease, and the role of hormones, vitamins, and enzymes in the regulation of these processes; the application of this knowledge to the problems of disease. Lectures, conferences, and laboratory. F, W; 1 unit.

491. Seminar in Biological Chemistry. Students and faculty presentation of assigned subjects of current importance in biological chemistry and related fields. Assigned reading. F, W, Sp; ½ unit.

493. Research in Biological Chemistry. Research on problems of biological importance with members of the graduate staff. F, W, Sp, S; 1 to 3 units.

CHEMISTRY (PHARMACEUTICAL)

Graduate education in pharmaceutical chemistry is a necessary part of a program for the creative advancement of rational medication in the health sciences.

Opportunities for the employment of the specialized knowledge acquired by graduate training in this field are available in the pharmaceutical industry in the synthetic development of new medicinal agents, the creation of new and stable dosage forms, the qualitative and quantitative evaluation of natural and synthetic drugs, the protection of quality in the manufactured product, the improvement of production processes, and the interpretation of the physical sciences to the health professions and the public. Equally important opportunities are available in the field of pharmaceutical education where a presently acute and always steady demand for teachers with this type of specialized education exists.

Admission to graduate study in pharmaceutical chemistry is subject to the general regulations of the Graduate College and such additional general regulations as are adopted by the Committee on Graduate Work in the Chicago Professional Colleges. Except in special cases, the applicant should have received the degree of Bachelor of Science in Pharmacy from a college or university approved by the Graduate College of the University of Illinois. His undergraduate program should have comprised, among other things: (1) thirty-six semester hours of undergraduate courses in chemistry, including at least ten hours of general inorganic chemistry and qualitative analysis, four hours of quantitative analysis, eight hours of organic chemistry, and three hours of physical chemistry; (2) eight semester hours of general physics; (3) six semester hours of college mathematics.

Of the minimum nine units required for the Master of Science degree in Pharmaceutical Chemistry at least four units shall have been completed in course work acceptable for graduate credit and at least four units shall have been completed in work leading to the production of an acceptable thesis (Chemistry 493). If, in the judgment of the major adviser, the undergraduate background requires it, the applicant may be required to complete more than the minimal number of units in course work before a thesis subject is completed.

Applicants for admission to a program of study leading to the degree of Doctor of Philosophy in Pharmaceutical Chemistry are subject to the general rules of the Graduate College of the professional colleges.

The minor field of study may be selected from those available on this campus such as bacteriology, biological chemistry, pharmacognosy, pharmacology, and pharmacy.

An acceptable thesis shall be presented as the result of original investigation in the major field of study accomplished during registration in Chemistry 493.

All graduate study programs in pharmaceutical chemistry are under the general supervision of the Head of the Department of Chemistry. The applicant may select any member of the Graduate Faculty in the department as his major adviser and the major adviser shall have immediate supervision of the applicant's program of study, subject to the approval of the Head of the Department.

Graduate Teaching Faculty

Professor and Head of Department: George L. Webster, Ph.D.
Associate Professors: Hugh L. Davis, Ph.D., Ernst R. Kirch, Ph.D.
Assistant Professors: Alfred J. Perkins, Ph.D., Norman R. Joseph, Ph.D.

Courses for Graduates

301. Qualitative Organic Analysis. A study of the physical and chemical properties of organic compounds, their classification reactions and methods of synthesis of typical derivatives which will lead to the identification of individual compounds. It includes conferences and laboratory work. Offered to classes of four or more students after consultation with the Head of the Department. F, W, Sp, S; ½ unit. Prerequisite: One year of organic chemistry.

302. Ultimate Analysis of Organic Compounds. The course consists of study and practice in the methods of analysis for common elements in organic compounds. Conferences and laboratory work to be arranged. One conference and minimum of eight hours laboratory each week. F, W, Sp, S; ½ unit. Prerequisite: One year of organic chemistry.

303. Advanced Drug Assay. The course consists of conferences, library and laboratory work related to the methods of detecting impurities which develop and determining the quality of drugs during storage, the improvement of existing methods of assay of drugs or the development of new assays or new types of assays. F, W, Sp, S; ½ to 2 units. Prerequisite: Quantitative analysis, drug assay, chemistry of synthetic drugs, chemistry of natural products.

304. Phytochemistry. The course consists of lectures, library and laboratory work in the properties and suitable methods of isolation and purification of typical examples of plant constituents. Offered to groups of four or more students. F, W, Sp, S; 1 to 2 units. Prerequisite: Drug assay and chemistry of natural products.

305. Advanced Organic Chemistry — Reactions. A study of the mechanisms and applications of organic chemical reactions frequently used in synthesis. Lectures and laboratory work. Three lectures each week. Offered to classes of four or more students. F or W; ½ unit. Prerequisite: One year of organic chemistry.

306. Advanced Organic Chemistry — Theory. A study of the theories of organic chemical reactions and structure. Lectures and library work. Three lectures each week. Offered to classes of four or more students. Sp; ½ unit. Prerequisite: One year of organic chemistry.

308. The Chemistry of Heterocyclic Compounds. The course consists of lectures and assigned reading and problems on the occurrence, nomenclature, reactions, and methods of synthesis of the heterocyclic compounds containing oxygen, sulfur, and nitrogen. Sp; ½ unit. Prerequisite: One year of organic chemistry.

311. Advanced Inorganic Chemistry. A systematic study of the elements based upon the periodic table and of current thought on the nature of the chemical bond. Laboratory work consists of the preparation of inorganic compounds. Two lectures or conferences and three hours of laboratory each week. W (alternate years); ½ unit. Prerequisite: General chemistry, qualitative and quantitative analysis; senior or graduate standing.

312. Introduction to Chemical Thermodynamics. A study of the fundamental concepts and methods of thermodynamics, their application to chemical problems; the use of tables of thermodynamic data and of data in current chemical publications. Three lectures or conferences each week. W (alternate years); ½ unit. Prerequisite: Four semester hours of physical chemistry or equivalent.

342. The Chemistry of Synthetic Drugs. A study of modern synthetic drugs with regard to their nomenclature, methods of synthesis, relation to other drugs having similar therapeutic properties, physical and chemical properties. Four lectures each week. W; ½ unit. Prerequisite: One year of organic chemistry.

343. Chemical Toxicology. A course concerned with the common sources; chemistry of the physiological action, methods of isolation, and identification of toxic agents commonly encountered as industrial hazards and as the cause of accidental or purposeful poisoning. Two lectures and three three-hour laboratory periods each week. Sp; ½ unit. Prerequisite: Organic chemistry and concurrent registration in pharmacology.

346. Synthesis of Drugs. A continuation of the study of organic chemistry with practice in and emphasis on the application of general and special reactions to the synthesis of drugs. Lectures, library and laboratory work. Two lectures and three three-hour laboratory periods each week. W; ½ unit. Prerequisite: One year of organic chemistry.

349. Pharmaceutical Assaying. Chemical and physical methods of analysis of raw materials and dosage forms of medication involving the principles of sampling and quantitative separation of active compounds from inactive diluent or vehicle or from other active components. Two lectures or conferences and three three-hour laboratory periods each week. W, Sp; ½ unit. Prerequisite: Drug assay.

350. Instrumental Analysis. The principles, methods, and techniques of analytical chemistry using modern electrical and electronic instruments. Sp; 1 unit.

409. Vitamin Assay. Methods for determining vitamins in pharmaceutical and food products by the use of the spectrophotometer and fluorophotometer; micro-

biological methods for determining vitamins and other nutrilites. Three conferences and ten to twelve laboratory hours each week. Sp; 1 unit.

410. Vitamin Assay. Continuation of 409. S; 1 unit.

436. Physical Biochemistry. General theories of homogeneous and heterogeneous equilibrium in physico-chemical systems; chemical kinetics with special reference to enzymes; theories of colloidal behavior; applications of general principles to problems involving cells and tissues. Emphasis is placed on methods of physical chemistry as applied in medical sciences. Lectures and seminars. Sp; ½ unit. Offered in 1950 only.

DERMATOLOGY

Graduate programs are not conducted by this department since the research problems involved are fundamentally of a basic science nature. Students registered for graduate work in basic science and other departments may take advantage of the course offering in this department.

Graduate Teaching Faculty

Professor and Head of Department: Francis E. Senear, M.D.
Associate Professor: Adolph Rostenberg, Jr., M.D., M.S.

Courses for Graduates

401. Fundamentals of Allergy. Fundamentals of allergy considering the nature of that alteration, the varieties of sensitization which may develop, and the immunologic properties of these in detail. F, W; ½ unit. Prerequisite: M.D. degree or graduate training in immunology.

HISTOLOGY

The Department of Dental Histology offers work toward the degree of Master of Science in Histology. The program is devised to provide training for teachers and investigators in the field of histology as it applies more specifically to the basic sciences related to dentistry. A student, however, is required to have a knowledge of the entire field of histology as it applies to the human body.

In addition to the general requirements of the Graduate College, the applicant must also have completed his Doctor of Dental Surgery degree. In certain cases an undergraduate dental student with a bachelor's degree may be accepted providing he has maintained at least a B average and has completed at least four quarters of the dental curriculum. Nonprofessional students are not accepted.

Course requirements include Histology 401 and at least four units in Histology 493 and 494. Attendance at the Oral Research Seminar is required but does not carry graduate credit.

The usual thesis on an original investigative problem is required.

Students completing the requirements for the master's degree in Histology may apply for admission for work toward the Doctor of Philosophy degree in the Department of Anatomy and must comply with requirements of that department for the doctorate.

Graduate Teaching Faculty

Professor and Head of Department: Isaac Schour, Ph.D., D.D.S., D.Sc.
Associate Professor: Joseph P. Weinmann, M.D.

Courses for Graduates

401. Advanced Oral Histology. Lectures, discussions, and laboratory work pertaining to special subjects and problems in oral histology. W, Sp; ½ to 1 unit. Prerequisite: Histology 305, 328, and 329, or equivalent.

493. Research in Microscopic Anatomy of Teeth and Related Structures. W, Sp; 1 to 3 units. Prerequisite: Histology 305, 328, 329, or equivalent.

494. Research in Experimental Histo-Physiology of Teeth and Investing Tissues. F, W; 1 to 3 units. Prerequisite: Histology 401.

MEDICINE

The Department of Medicine offers work leading to the Master of Science degree. The program is designed to afford training for a keener approach to the theory and practice of medicine by emphasis on basic sciences, to provide experience in research method in the clinical field, and to develop clinical teachers who in acquiring the degree and in qualifying for the specialty board in medicine will have greater promise of rendering instruction to medical undergraduates.

A Doctor of Medicine degree is required in addition to the usual requirements of the Graduate College with the exception that currently registered medical students may be accepted if they have the bachelor's degree and have completed at least four quarters of the medical curriculum with a minimum average of 85. Such students will not be eligible for the master's degree until they have been granted the Doctor of Medicine degree.

Courses required are four units in Medicine 493 and at least one seminar per quarter for three quarters in one of the basic sciences as follows: Anatomy 491, Bacteriology 491, Biological Chemistry 491, Pharmacology 491, Physiology 491, 492. Attendance at staff conferences and ward rounds as determined by the department is required.

The thesis must conform to standard requirements of the Graduate College and be of such merit as to warrant publication in part or in full in an acceptable scientific or clinical journal.

Graduate Teaching Faculty

Professor and Head of Department: Robert W. Keeton, M.S., M.D.
Professor: Edmund F. Foley, M.D.
Associate Professors: Carroll L. Birch, M.S., M.D., Ford K. Hick, Ph.D., M.D., Isadore Pilot, B.S., M.D., Louis R. Limarzi, M.S., M.D., Ben Z. Rappaport, M.S., M.D., Frederick C. Lendrum, Ph.D., M.D.
Assistant Professor: Mitchell A. Spellberg, M.S., M.D.

Courses for Graduates

493. Research in Medicine. F, W, Sp, S; 1 to 3 units.

NEUROLOGY AND NEUROLOGICAL SURGERY

Work in the Department of Neurology and Neurological Surgery is not offered toward graduate degrees awarded from this department. Research may be conducted in the department if approved by the department head and may be applied toward the partial fulfillment of requirements for graduate degrees pursued in other departments of instruction. Students pursuing degrees in anatomy, physiology, pharmacology, and other areas occasionally find it advantageous to pursue this routine.

Graduate Teaching Faculty

Professor and Head of Department: Eric Oldberg, Ph.D., M.D.
Distinguished Professor: Percival Bailey, Ph.D., M.D.
Professor: Paul C. Bucy, M.S., M.D.
Associate Professor: Ben W. Lichtenstein, M.S., M.D.

Courses for Graduates

493. Research in Neurology, Neurological Surgery, and Neuropathology. F, W, Sp, S; 1 to 3 units.

OBSTETRICS AND GYNECOLOGY

The degree of Master of Science is offered in Obstetrics and Gynecology. Objectives in the program include the training of investigators and teachers for staff appointments at medical colleges; preparing medical graduates for future leadership in scientific participation and organization of hospital staff conferences throughout areas where such facilities do not exist; and training medical personnel for a keener scientific approach to the practice of the specialty of obstetrics and gynecology.

A Doctor of Medicine degree is required for admission and a reading knowledge of at least one foreign language (French or German) or an equivalent of six semester hours of credit in a language, in addition to the regular Graduate College requirements.

Courses which must be completed as a partial requirement for the degree are at least four units in Obstetrics and Gynecology 493, in addition to Bacteriology 402, 403, 404, and at least one seminar course per quarter for three quarters in either Anatomy 491, Bacteriology 491, Biological Chemistry 491, Pharmacology 491, Physiology 491, 492. Attendance at staff conferences and ward rounds may be required by the head of the department. A thesis based on an original laboratory investigative effort of such quality as to merit publication in full or in part in a standard journal devoted to obstetrics and gynecology is required.

Graduate Teaching Faculty

Professor and Head of Department: FREDERICK H. FALLS, M.S., M.D.

Courses for Graduates

493. RESEARCH IN OBSTETRICS AND GYNECOLOGY. The course is offered for graduate students planning to specialize in obstetrics and gynecology, and particularly for those who expect to make teaching of obstetrics and gynecology part of their future professional work. F, W, Sp, S; 1 to 3 units.

OPHTHALMOLOGY

The degree of Master of Science is offered in Ophthalmology. This curriculum is designed for those individuals who are entering ophthalmology, and who are interested in pursuing investigational phases relating to the eye. In fulfilling the requirements for the degree of Master of Science in Ophthalmology, the candidate will not only learn the methods of research on a specific problem, but will also apply the concepts of basic medical sciences to ocular problems.

The department recognizes its responsibility to do its part to alleviate the serious dearth, in the United States, of ophthalmologists who may be expected to contribute toward raising the general level of ophthalmology in teaching and research, toward the establishment of new ophthalmological facts, and toward the solution of the many existing problems. The purpose of the graduate program is to encourage qualified individuals to engage in investigational phases of ophthalmology and to formalize and systematize such investigational activities.

Admission requirements include the Doctor of Medicine degree and completion of either a postgraduate course or residency in ophthalmology of at least one year. In exceptional circumstances, work towards the Master of Science degree can be done coincident with the postgraduate or residency training.

Courses required of all candidates as a partial fulfillment of requirements for the degree include at least four units in Ophthalmology 493. For those who are admitted without one year of organized postgraduate basic science training, at least one seminar course each quarter for three quarters in one of the following is required: Anatomy 491, Bacteriology 491, Biological Chemistry 491, Pharmacology 491, Physiology 491, 492, Pathology 491. In individual cases graduate courses may be required especially in the basic medical sciences relating to the student's research problem. Attendance at conferences in clinical ophthalmology is required.

The thesis will consist of a report or original work acceptable to and approved by a thesis committee consisting of at least three members chosen by the Head of the Department, at least one of these being a non-member of the Department of Ophthalmology. The thesis should be of a caliber suitable for publication.

Graduate Teaching Faculty

Professor and Head of Department: WILLIAM F. HUGHES, JR., A.B., M.D.

Courses for Graduates

493. RESEARCH IN OPHTHALMOLOGY. F, W, Sp, S; 1 to 3 units.

ORAL SURGERY

The degree of Master of Science is offered in Oral Surgery. The curriculum is offered with the objective of training teachers and investigators for staff positions in oral surgery and to train students for the scientific practice of the specialty of oral surgery.

A Doctor of Dental Surgery degree from an accredited institution is required. In addition, the applicant must have completed three quarters of an organized postgraduate curriculum leading to a certificate in oral surgery which emphasizes the basic sciences comparable to the one offered at the University of Illinois College of Dentistry.

Three units of advanced credit will be allowed toward the Master of Science degree as recognition of work included in the postgraduate curriculum.

Since all applicants can not be accommodated, the permission of the Head of the Department must be secured. Letters of recommendation from deans and former teachers are factors that are considered in selecting candidates.

Courses required of all candidates as a partial fulfillment of requirements for the degree include at least four units of Oral and Maxillofacial Surgery 493. Three units of advanced credit toward the degree are allowed for courses such as Anatomy 403, Advanced Oral Histology 401, and others or their equivalents already completed in the postgraduate curriculum which is a required prerequisite to admission for graduate work. An additional two units to complete requirements for the degree are to be determined by the major adviser and many include further course work in basic science departments. Research toward the thesis requirement may be conducted in related fields such as oral pathology or oral histology. The student will be registered on a half-time basis in the Graduate College during his entire period of registration and will devote the other portion of his time to teaching and assisting in the department.

Graduate Teaching Faculty

Professor and Head of Department: BERNARD G. SARNAT, M.D., D.D.S.

Courses for Graduates

493. RESEARCH IN ORAL AND MAXILLOFACIAL SURGERY. F, W, Sp, S; 1 to 3 units.

ORTHODONTIA

The degree of Master of Science is offered in Orthodontia in an attempt to train men as future teachers and research workers in this field for positions on the staffs of dental colleges.

The degree of Doctor of Dental Surgery and a certificate representing one academic year of an organized postgraduate curriculum in orthodontia is required of all applicants. Since the number of students who can be accepted is limited, the approval of the Head of the Department is required.

Required courses include Orthodontia 401, 402, and at least four units in Orthodontia 493. Three units of advanced credit toward the graduate degree are allowed for completion of graduate courses pursued in the postgraduate curriculum. This includes Anatomy 401 and Dental Histology 401. Additional courses in the basic science or other departments may be required by the major adviser.

A thesis on an original laboratory investigation involving basic science applications to a clinical problem is required.

Graduate Teaching Faculty

Professor and Head of Department: Allan G. Brodie, Ph.D., D.D.S.

Courses for Graduates

401. Orthodontia. This course reviews the historical background of the specialty, the classifications of malocclusion, normal growth and development of the human head, abnormal growth and development, study of clinical procedures and therapy, study of methods of analysis and diagnosis, and study of general research methods pertaining to the field. F, W, Sp, S; 1 to 3 units.
402. Applied Anatomy and Growth of the Head. Phylogenetic development of the head, comparative anatomical considerations of the head and dental apparatus, study of research methods employed in growth studies, application of general research methods to studies of the head. Sp; 1 unit.
493. Research in Orthodontia. Special research in fields appropriate to the major subject. F, W, Sp, S; 1 to 3 units.

OTOLARYNGOLOGY

A curriculum leading to graduate degrees is not offered in this department but students registered for Master of Science or Doctor of Philosophy degrees in the basic science of other departments may conduct a significant part of their research in problems of interest to this department. With mutual interdepartmental consent, such data may be applied toward the development of a thesis in partial fulfillment of the requirements for a degree.

Graduate Teaching Faculty

Professor and Head of Department: Francis L. Lederer, B.S., M.D.
Assistant Professor: Jean L. Utley, Ph.D.

Courses for Graduates

493. Research in Laryngology, Rhinology, Otology, and Rehabilitation. Special scientific work for those desiring to do productive research in any area of the specialty, or to prepare for teaching. F, W, Sp, S; 1 to 3 units.

PATHOLOGY

In pathology care must be exercised to distinguish sharply between graduate work and postgraduate training. The former should be looked upon as advanced study of mechanisms of pathogenesis of functional and structural expressions of disease. Such studies, with appropriate research effort, should involve the utilization, as needed, of the tools and methods of the bacteriologist, biochemist, biophysicist, pharmacologist, or physiologist. The latter (postgraduate training) may be obtained best through residency training with the objective of becoming competent for the practice of either anatomic pathology or clinical pathology or both of these specialties of medicine.

If these conclusions are valid, there are two principal ways in which graduate training in pathology is of value. First, for students planning an academic career of research and teaching in pathology, graduate work through either master's or doctorate levels should provide excellent preparation. Secondly, for persons undertaking graduate studies in other biological sciences (anatomy, bacteriology, biochemistry, pharmacology, physiology), pathology affords an excellent opportunity for minor work.

The two possibilities for graduate study with pathology as a major are the following:

(1) Outstanding students who have completed the basic science courses, including general and special pathology in Class A medical or dental schools, and have received a bachelor's degree are eligible for graduate work in pathology.

(2) For students not seeking the Doctor of Medicine or Doctor of Dental Surgery degrees it is possible, in exceptional instances, to permit graduate work in pathology, provided the student has satisfactorily completed medical courses in microscopic anatomy (Anatomy 404, 405), gross anatomy (Anatomy 401, 402, and 403 are recommended for the Master of Science degree and required for the Doctor of Philosophy degree), biochemistry (Biological Chemistry 301), and physiology (Physiology 324, 325, and 326). In these instances the undergraduate medical course in general and special pathology (Pathology 325) constitutes a course requirement for graduate study.

For students enrolled in the Graduate College with majors in anatomy, bacteriology, biochemistry, pharmacology, or physiology, pathology may be taken as a minor, provided the applicant has satisfactorily completed medical courses or their equivalents in microscopic anatomy, physiology, and biochemistry. In these instances the medical student course in general and special pathology (Pathology 325) usually is the first requirement by the Department of Pathology.

Required courses for the Master of Science degree include Pathology 325, 491, and at least four units in Pathology 493. Suggested courses in addition are Pathology 402 and 403. Attendance at certain staff conferences, seminars, and clinical pathologic conferences may be required.

Candidates for the degree of Doctor of Philosophy must include the following courses or their equivalent in their program of study: Anatomy 401, 402, 403, 404, 405, Biological Chemistry 301, Physiology 324, 325, 326, Pathology 325, 402, 403, 491, and at least nine units in Pathology 493, or research courses in other departments. The usual requirement for languages, major and minor studies, residence, and examinations as set forth by the Graduate College are enforced.

The thesis is based ordinarily on the problem selected for investigation and the usual standards for both Master of Science and Doctor of Philosophy candidates are required. It is believed that great latitude should be allowed in the choice of problems for investigation. Studies concerning any of the biological phenomena operating in health or in disease are considered suitable provided the problem is of adequate dimension, scope, and importance. Theses based on work other than that entailing experimental methods are not approved for Doctor of Philosophy work and only in exceptional instances will such theses be approved for Master of Science candidates.

Graduate Teaching Faculty

Professor and Head of Department: Granville A. Bennett, A.M., M.D.

Professors: Cecil A. Krakower, M.D., C.M., George M. Hass, M.D., David J. Davis, Ph.D., M.D. (Emeritus).

Associate Professors: Alexander J. Nedzel, M.D., Maurice Lev, B.S., M.D.

Assistant Professors: Hubert R. Catchpole, Ph.D., Earl W. Cauldwell, M.S., M.D., Charles B. Taylor, B.S., M.D.

Courses for Graduates

325. General and Special Pathology. The basic principles of pathological processes, including tissue injury and repair, inflammation, circulatory disturbances, retrograde processes, and tissue responses to specific infectious agents and neoplasms,

are considered in the first part of the course. In the latter part of the course, the disease processes affecting each organ and anatomic system are considered in greater detail. The laboratory exercises are designed to correlate and interpret the gross and microscopic changes occurring in diseased tissues. Lectures, demonstrations, quiz conferences, and laboratory. Thirteen hours each week. F, W; 1½ units. Prerequisite: Anatomy, histology, and biological chemistry; at least introductory work in bacteriology and physiology.

401. Experimental Pathology. Lecture, seminar, and laboratory course in the essentials of experimental pathology. Limited to six qualified students. F; 1 unit. Prerequisite: Undergraduate courses in pathology and anatomy, including histology.

402. Histochemistry. Lecture and laboratory course in methods and results of investigation in histochemistry. Fields covered will depend on interests of students and may include work with inorganic substances, carbohydrates, vitamins, hormones, nucleic acids, enzymes, and amino acids. Limited to six students. Sp; 1 unit. Prerequisite: Biological chemistry and histology.

403. Physiological Basis of Endocrine Pathology. Lecture and laboratory work in physiological mechanisms underlying abnormal endocrine structure and function. Limited to six qualified students to be selected after an interview. W; 1 unit. Prerequisite: Physiology, biological chemistry, and anatomy.

491. Pathology Seminar. Weekly seminar covering selected fields of interest and research in pathology. F, W; ½ unit.

493. Individual Research and Advanced Study in Pathology. Qualified graduate students who wish to do research in the department or study selected topics in pathology may register for this course after approval by the instructor and the Head of the Department. F, W, Sp, S; 1 to 3 units.

PEDIATRICS

The Department of Pediatrics has a serious responsibility in training physicians of unusual ability for an academic career in pediatrics. It is believed that this responsibility can be discharged most effectively by offering a course in research designed to emphasize the application of the basic sciences to clinical pediatrics in order to provide candidates with a background enhancing their effectiveness in teaching and research. While a graduate degree is not offered in pediatrics, medical graduates or students pursuing the medical curriculum may register for research in the department in fundamental problems having possible applications in pediatrics while registered for a Master of Science or Doctor of Philosophy degree in a basic science department.

Graduate Teaching Faculty

Professor and Head of Department: Henry G. Poncher, M.D.
Professors: Julius B. Richmond, M.S., M.D., Julius H. Hess, M.D. (Emeritus).

Courses for Graduates

493. Research in Pediatrics. Graduate research is offered in the fields of physiology of the newborn, growth and development, nutrition and nutritional disturbances, metabolic and medical diseases in infants and children, pediatric hematology and physiology of the blood-forming organs in infants and children. F, W, Sp, S; 1 to 3 units.

PEDODONTICS

The degree of Master of Science is offered in Pedodontics. The curriculum is devised to train individuals for teaching and research positions in dental colleges and to contribute toward scientific knowledge.

In addition to the usual requirements of the Graduate College, applicants must have a Doctor of Dental Surgery degree and must have completed three full quarters of the postgraduate curriculum in pedodontics and received a certificate before being eligible for registration in the Graduate College for work toward a Master of Science degree. Approval of the Head of the Department is required since all applicants can not be accommodated.

Three units of graduate credit are allowed as advanced credit for having completed the postgraduate curriculum. At least four additional units must be earned in Pedodontics 493. Additional courses, especially those offered in basic science departments, may be required by the major adviser.

A thesis on an original problem is required.

Graduate Teaching Faculty

Professor and Head of Department: Maury Massler, M.S., D.D.S.

Courses for Graduates

493. Research in Pedodontia. Special research in fields appropriate to the major subject. F, W, Sp, S; 1 to 3 units.

PHARMACOGNOSY

Programs leading to the degrees of Master of Science and Doctor of Philosophy are offered in Pharmacognosy and are subject to the general regulations of the Graduate College, as described elsewhere.

Of a minimum of nine units required for the degree of Master of Science, a minimum of four units of research credit in the major field is required. Of the minimum of eighteen units necessary for the degree of Doctor of Philosophy, not less than nine units must be devoted to research credit, and not less than ten units to formal course study (including formal courses credited toward the master's degree). Such minimal programs are accepted in the exceptional case, rather than as a general rule.

Prerequisites for admission, in addition to the general requirements of the Graduate College, include a degree of Bachelor of Science in Pharmacy from an accredited institution. Candidates for training beyond the master's level shall have completed the Master of Science degree in this Graduate College, except where in the opinion of the department head, work of equivalent value has been completed elsewhere.

The student must show evidence of undergraduate training adequate to the program projected in the Graduate College. Additional or repeated undergraduate courses may be required, without graduate credit, to complete the necessary background. Such courses must be completed before or during the first year of graduate study.

Facilities for teaching and research in this department are offered to properly qualified students in three principal categories: students majoring in pharmacognosy; major students from other fields electing minor study in pharmacognosy; graduate students, upon the recommendation of their director, seeking courses in this department as adjuncts to their major and minor programs in other fields.

Qualified candidates for graduate training in this department will confer with the appropriate members of the graduate faculty for the purpose of evaluating needs and objectives.

The following courses will be required of all students seeking advanced degrees in pharmacognosy: Pharmacognosy 301, 302, 491. Candidates for the degree of Master of Science must have completed not less than one unit, and candidates for the Doctor of Philosophy not less than two units, from the following group: Pharmacognosy 303, 304, 310, 311, 314.

Additional courses needed to complete the major program in pharmacognosy may be elected or assigned from the above groups, or from the following: Pharmacognosy 306, 401, 405, and 493.

Supporting programs including such courses or minors may be chosen from the following: Biological Chemistry 301, Chemistry 303, 304, 409, 410, Pharmacology 325, 401, 491, 493, Bacteriology 401, 402, 403, 404.

Graduate Teaching Faculty

Professor and Head of Department: FRANK T. MAHER, Ph.D., M.D.
Associate Professor: RALPH F. VOIGT, Ph.D.

Courses for Graduates

301. PLANT ANATOMY. A microscopic study of the structure of vascular plants with particular attention to the development and evaluation of the vascular systems in all parts of the plant. Two lectures and two three-hour laboratory periods each week. W; 1 unit.

302. PLANT PHYSIOLOGY. A study of life processes in plants, with particular attention to the cell as the fundamental functional unit. The basic principles of plant metabolism will be emphasized in relation to essential elements, energy relationships, and other environmental factors. Three lectures or conferences and two three-hour laboratory periods each week. Sp; 1 unit. Prerequisite: Pharmacognosy 301.

303. SYSTEMATIC PHARMACOGNOSY. A taxonomic study of the flowering plants, with particular emphasis upon those of drug import. Relationship of the principal orders and families, rules of nomenclature, and systems of classification will be considered. Laboratory work will include identification of species, together with the collection, identification, and preservation of drug plant specimens. Two lectures and three three-hour laboratory periods each week. F or Sp; 1 unit.

304. GENETICS. This course will consider the fundamental principles of biological inheritance, and the application of these in the study of plant and animal life. Three lectures and two three-hour laboratory periods each week. F or W; 1 unit.

306. PHARMACOGNOSY OF THE ALLERGENS. An atmospheric survey and study of the wind-borne pollen and fungi spores; the identification and distribution of hay fever plants and the practical application of these studies. Two lectures and one three-hour laboratory period each week. Sp, S; ½ to 1 unit.

310. CRYSTALLOGRAPHY. A study of basic crystal morphology, the principles of optical crystallography, and an introduction to the practical application of these studies. Two lectures and one three-hour laboratory period each week. W; ½ unit.

311. CHEMICAL MICROSCOPY. The application of the principles of crystallography and of microchemistry to the identification of organic and inorganic chemicals. Special attention will be given to alkaloids, glycosides, and other materials of biological and pharmaceutical interest. One lecture and two three-hour laboratory periods each week. Sp; ½ unit. Prerequisite: Pharmacognosy 310.

314. HISTOLOGICAL TECHNICS. A theoretical and practical development of the knowledge and skills essential to the preparation of biological materials for microscopic study. One lecture and two three-hour laboratory periods each week. F or W; ½ unit.

316. COMMERCIAL PHARMACOGNOSY. A study of the traffic in crude drugs and related products, with a consideration of the basic principles governing the production, distribution, and consumption of these materials. Three lectures or conferences each week. F; ½ unit.

401. DRUG PLANT CULTIVATION. A consideration of the principles involved in the propagation and care of drug plants, combined with practical applications at the Drug Plant Experiment Station. Attention will be given to the principles and practices of harvesting, preparation, storage, and marketing. Two lectures and three three-hour laboratory periods each week. Sp or S; 1 unit.

405. QUANTITATIVE PHARMACOGNOSY. The use of quantitative methods and a study of their application in the macroscopic and microscopic evaluation of drugs, including the development of new methods. One lecture and two three-hour laboratory periods each week. W; ½ unit.

491. Pharmacognosy Seminar. Reviews, reports, and discussions covering the latest advances in pharmacognosy, phytochemistry, genetics, and other related subjects. F, W, or Sp; ½ unit.

493. Research in Pharmacognosy. Problems may be selected in any division of pharmacognosy including histological pharmacognosy, microchemical pharmacognosy, the chemistry of drug constituents, the standardization of drugs, drug plant cultivation and breeding or food microscopy. F, W, Sp, S; 1 to 3 units.

PHARMACOLOGY

A program leading to the Master of Science and Doctor of Philosophy degrees is offered in the Department of Pharmacology. The curriculum is designed to train teachers and research personnel for university, industrial, and governmental laboratories. Candidates for the Master of Science or Doctor of Philosophy degrees in Pharmacology may pursue research in one of the following disciplines: toxicology, pharmacodynamics, chemotherapy, or neuro-pharmacology.

Applicants possessing the Doctor of Medicine or Doctor of Dental Surgery degree and students currently pursuing a curriculum toward one of these degrees are given preference. When adequate laboratory space is available, superior students who have completed all premedical course work and otherwise fulfill the Graduate College admission requirements may be accepted by the department.

Courses required of all candidates are Pharmacology 325, 401, and 493. Master of Science candidates whose research is in toxicology must take, in addition to the above, Biological Chemistry 301; if the research problem is in the field of chemotherapy, Bacteriology 320, 325, and Biological Chemistry 301 are required. Anatomy 407 and Physiology 324, 325, 326 are required of students pursuing a problem of a neuropharmacological nature. Those whose major interest is in pharmacodynamics must take Physiology 324, 325, 326, and Biological Chemistry 301.

Doctor of Philosophy candidates in pharmacology conducting research in one of the optional disciplines must first satisfy the Master of Science course requirements in that discipline and pursue certain additional work. If the research is of a toxicological nature, the student shall satisfy a minor in chemistry or organic chemistry and complete courses in Chemistry 305, 306, Physiology 324, 325, 326, and Pharmacognosy 311. If the thesis problem involves pharmacodynamics, the student's minor shall be physiology or biological chemistry; if it involves chemotherapy, the candidate shall satisfy a minor in bacteriology or biological chemistry and complete Anatomy 404, 405, Pathology 325, Physiology 324, 325, 326; and students pursuing a neuropharmacological discipline shall obtain a minor in physiology and complete course work in Anatomy 401, 402, 403, 404, 405, 406, and Biological Chemistry 301.

The thesis must be of such merit as to warrant publication in part or in full in a recognized pharmacological or toxicological journal.

Graduate Teaching Faculty

Professor and Head of Department: Carl C. Pfeiffer, Ph.D., M.D.
Professors: Walter J. R. Camp, Ph.D., M.D., Hugh A. McGuigan, Ph.D., M.D. (Emeritus).
Associate Professor: Klaus Robert W. Unna, M.D.
Research Associate: James A. Bain, Ph.D.
Instructor: Theodore R. Sherrod, Ph.D.

Courses for Graduates

325. Pharmacology, Toxicology, and Chemotherapy. Lectures and quizzes, W and Sp; one three-hour laboratory period each week, W; one two-hour demonstration each week, Sp; ⅔ unit each quarter. Prerequisite: Biological chemistry and physiology.

401. Biometrics and Applied Statistics. This course is designed as an introduction to the rational use of simple statistical methods in the planning of experiments and

evaluation of results. Emphasis will be placed on the practical application of statistics as working tools rather than discussion of the mathematical theory of statistics. F; ½ unit.

491. Pharmacological Seminar. Weekly seminar. Presentation of original research in pharmacology, toxicology, and chemotherapy. F, W, Sp, S; ½ unit.

493. Research. Supervised research in pharmacodynamics, neuro-pharmacology, toxicology, and chemotherapy. F, W, Sp, S; 1 to 3 units. Prerequisite: Physiology and physiological chemistry except in toxicology (major in chemistry in undergraduate work).

PHARMACY

The degree of Master of Science is offered in the Department of Pharmacy. Prospective students must have completed a Bachelor of Science degree in an accredited college of pharmacy or must have completed a bachelor's degree in some other area and be currently in pursuit of a Bachelor of Science degree in Pharmacy. The usual requirements of the Graduate College regarding undergraduate scholastic average are enforced.

Required work must include four units in Pharmacy 493 and additional units in other course offerings in the department. Supporting courses in chemistry, pharmacology, bacteriology, and other areas may be required of the individual student by his major adviser.

A thesis on an original investigation is required.

Graduate Teaching Faculty

Professor and Head of Department: Earl R. Serles, Ph.D.
Associate Professor: Dwight L. Deardoroff, Ph.D.
Assistant Professor: Charles A. Reed, Ph.D.

Courses for Graduates

400. Hospital Pharmacy. Study and practice of the administrative and operational aspects of hospital pharmacies, including organization of staff, business administration, cost accounting, location, space requirements, equipment, specifications, purchasing, inventory control, storage, therapeutic procedure, and services to floors. One lecture and nine hours practice each week. F; 1 unit.

402. Manufacturing Pharmacy. Lectures and laboratory work on the unit processes and equipment used in the preparation of parenteral products, tables, powders, extracts, suppositories, ointments, gels, emulsions, suspensions, and liquid preparations. One lecture and nine hours practice each week. F, W, Sp; 1 unit each quarter for not more than three quarters.

491. Seminar in Pharmacy. Presentation of individual research contributions and of topics related to pharmacy. Each student is assigned a subject for presentation during the quarter. F, W, Sp; ½ unit each quarter for not more than two quarters.

493. Research in Pharmacy. F, W, Sp, S; 1 to 3 units.

PHYSICAL MEDICINE AND REHABILITATION

The degree of Master of Science is offered in Physical Medicine and Rehabilitation. The rapid growth of physical medicine and rehabilitation as a specialty in medicine is attracting an increasing number of physicians to seek additional basic and clinical training in physiatry. A number of hospitals in this area have been approved for clinical training for future investigators and teachers. Interested students are encouraged to obtain advanced work.

The Doctor of Medicine degree is required for admission in addition to other routine requirements of the graduate college.

Courses required include the following: Anatomy 401, 402, 403, 407, Clinical Science

400, and four units in Physical Medicine and Rehabilitation 493. At least one seminar course per quarter for a minimum of three quarters in one of the following is required: Anatomy 491, Bacteriology 491, Biological Chemistry 491, Pharmacology 491, Physiology 491, 492, Pathology 491. Attendance at certain selected seminars and conferences or ward rounds may be required by the major adviser.

A thesis on a research problem of an original nature must be completed in the department.

Graduate Teaching Faculty

Professor and Head of Department: H. Worley Kendell, M.D.

Courses for Graduates

493. Research in Physical Medicine. Open to physicians who in addition to their medical degree have completed at least one year of internship and who plan to specialize in the field of physical medicine. F, W, Sp, S; 1 to 3 units.

PHYSIOLOGY

The graduate program in physiology leads to Master of Science and Doctor of Philosophy degrees. The curriculum is aimed at the education of candidates for careers in teaching and research primarily in relation to colleges of medicine, dentistry, and pharmacy, and for appointments to positions in governmental and industrial institutions and laboratories. Through the graduate program of the department, present and future medical practitioners may receive educational and research experiences which are invaluable to sound medical practice and are usually unavailable in the regular undergraduate curricula.

Applicants with a Doctor of Medicine or Doctor of Dental Surgery degree and students having completed two years of the undergraduate medical curriculum with a bachelor's degree are given preference. When laboratory space is available, students with a bachelor's degree who have completed premedical requirements and fulfill the general requirements of the Graduate College may be accepted.

The course requirements for the Master of Science degree are Biological Chemistry 301, Physiology 324, 325, 326, 491, and at least four units in Physiology 493. Recommended courses are Pharmacology 401, Physiology 492, Anatomy 404, 405.

For the Doctor of Philosophy degree, course requirements in addition to those required for the master's degree are Anatomy 404, 405, 407, Pharmacology 401, one and one-half units each in Physiology 491 and 492, and at least nine units in Physiology 493 (in addition to those credited toward the Master of Science degree). The minor requirement of four units may be satisfied in anatomy, bacteriology, biological chemistry, pathology, or pharmacology, or exceptionally in other departments. Conferences and seminars in other departments may be required by the major adviser in addition to specifically listed courses.

A thesis of sufficient merit to warrant publication in whole or in part in a recognized physiological or related journal is required.

Graduate Teaching Faculty

Professor and Head of Department: George E. Wakerlin, Ph.D., M.D.
Professors: Carlos I. Reed, Ph.D., Albert Bachem, Ph.D., Warren S. McCulloch, M.D., A.M.
Associate Professors: Raymond C. Ingraham, Ph.D., John P. Marbarger, Ph.D.
Assistant Professors: William V. Whitehorn, M.D., E. Painter Marcus, Ph.D., Alfred A. Schiller, M.D., M.S.
Lecturer: William S. Hoffman, Ph.D., M.D.

Courses for Graduates

324. HUMAN PHYSIOLOGY. Physiology of blood, circulation, and respiration. Lectures, quiz conferences, demonstrations, and laboratory. Sp; 1 unit. Prerequisite: Biological Chemistry 301.
325. HUMAN PHYSIOLOGY. Continuation of Physiology 324. Physiology of digestion, excretion, endocrines, nutrition, metabolism, and heat regulation. Lectures, quiz conferences, demonstrations, and laboratory. F; 1 unit. Prerequisite: Physiology 324.
326. HUMAN PHYSIOLOGY. Continuation of Physiology 325. Physiology of muscle and nerve, central nervous system, and senses. Lectures, quiz conferences, demonstrations, and laboratory. W; 1 unit. Prerequisite: Physiology 325.
491. SEMINAR IN SELECTED FIELDS OF PHYSIOLOGY. This course is designed to meet the needs of students desiring advanced detailed knowledge of a limited field of physiology. Each quarter different fields are selected and announced in advance. Subjects are: blood, heart, circulation, muscle, gastrointestinal tract, kidney, endocrinology, metabolism and nutrition, growth and neurophysiology. F, W, Sp, S; ½ unit. Prerequisite: Credit or registration in Physiology 324, 325, and 326.
492. PHYSIOLOGY SEMINAR. F, W, Sp; ½ unit. Prerequisite: Credit or registration in Physiology 324, 325, and 326.
493. RESEARCH IN PHYSIOLOGY. F, W, Sp, S; 1 to 3 units. Prerequisite: Credit or registration in Physiology 324, 325, and 326.

PHYSIOLOGY (CLINICAL SCIENCE)

The graduate program of the Department of Clinical Science is integrated with the undergraduate and research programs to achieve the following objectives: (1) to advance the science of medicine by contributing new knowledge and methods; (2) to train physicians in the application of basic science to the practice of medicine; and (3) to train persons seeking a career in medical research and teaching in the basic medical sciences. Programs of the department lead to Master of Science and Doctor of Philosophy degrees in Physiology.

The department has many more applicants than it can accommodate. The minimal requirements are (1) possession of the Doctor of Medicine or Doctor of Dental Surgery degree, or (2) completion of the first two years of medical school, or (3) completion of the premedical program and possession of the bachelor's degree.

The program for the Master of Science degree depends upon the background of the candidate. If a student has the Doctor of Medicine or Doctor of Dental Surgery degree or has completed the first two years of medical school the only course requirement is the departmental seminar, course 491. The remainder of the program consists of research in course 493. Students who do not have the Doctor of Medicine or Doctor of Dental Surgery degree or have not completed the first two years of medical school are required to take, in addition to the seminar course, the courses in Human Physiology (324, 325, 326) and Biological Chemistry 301. In individual instances recommendations are made concerning courses in anatomy, pathology, bacteriology, and pharmacology.

The submission of a thesis covering original investigation completed by the candidate is required.

Admission of students for work toward the Doctor of Philosophy degree is subject to the general requirements of the Graduate College stated in the forepart of this catalog. A student must have completed work toward the master's degree and fulfilled the requirements of the committee appointed to conduct the applicant's qualifying examination.

Course requirements for candidates for the Doctor of Philosophy degree who do not have the Doctor of Medicine or Doctor of Dental Surgery degree or have not completed the first two years of medical school in addition to those required in the Master of Science program are: Anatomy 404, 405, 407, Pharmacology 401, and Clinical Science 401, 491. The minor requirement of four units of work must be satisfied in any one of the departments of Anatomy, Bacteriology, Biological Chemistry, Pathology, Pharmacology, or exceptionally in other departments. The following seminar courses are recommended: Anatomy 491, Bacteriology 491, Biological Chemistry 491, Pharmacology 491, Physiology 491, 492, and Pathology 491.

Attendance at student-staff conferences in medicine, pediatrics, and neuro-physiology may be required by the major adviser.

The usual thesis requirement of the Graduate College must be complied with by each candidate for the degree.

Graduate Teaching Faculty

Distinguished Professor and Head of Department of Clinical Science: Andrew C. Ivy, Ph.D., M.D., D.Sc., LL.D.

Associate Professor: Morton I. Grossman, Ph.D., M.D.

Courses for Graduates

401. Advanced Physiology of the Digestive System. This course is designed for graduate students who desire to obtain special training for research on the alimentary tract. W; 1 unit. Prerequisite: Comparative anatomy, physiology, pharmacology, biological chemistry.

491. Seminar in Clinical Science. F, Sp, S; ½ unit. Prerequisite: Comparative anatomy.

493. Research in Clinical Science. F, W, Sp, S; 1 to 3 units.

PSYCHIATRY

Graduate degrees are not granted in psychiatry but graduate students may pursue course offerings in the department and apply the credit toward graduate degrees in a basic science department. Students pursuing work in the field of neurophysiology, for example, must fulfill the curriculum requirements for graduate degrees in physiology but may pursue course work or research in psychiatry toward the development of a suitable thesis. A curriculum leading to graduate degrees in psychology is not offered although certain offerings of a clinical nature may be made available by arrangement for psychology majors on the Urbana campus.

Graduate Teaching Faculty

Professor and Head of Department: Francis J. Gerty, B.S., M.D.

Professors: Warren S. McCulloch, M.D., A.M., Hugh T. Carmichael, M.D., C.M., M.S.

Associate Professors: Frederick A. Gibbs, A.B., M.D., Ladislas J. Meduna, M.D.

Courses for Graduates

493. Research in Psychiatry. Investigation of problems concerning psychiatry through laboratory, clinical, and sociological approaches; neuroanatomical, neurophysiological, biochemical, and psychological means are employed to throw light on the clinical problems of etiology, diagnosis, prevention, and treatment of behavioral disorders in man. Problems are not screened on the basis of apparent promise of practical application of results in the socio-clinical areas. The chief object is the exploration of the foundations of psychiatry. F, W, Sp, S; 1 to 3 units. Prerequisite: Graduate in medicine, student in medical courses, adequate preparation in an ancillary or related field — physiology, psychology, psychiatric social work.

494. Research in Juvenile Behavior. Research on some particular aspect of juvenile behavior, either in terms of etiology, symptomatology, or treatment, or possibly a combination of these. F, W, Sp, S; 1 to 3 units. Prerequisite: Psychological or psychiatric training.

RADIOLOGY

The graduate curriculum in radiology leads to the Master of Science degree. Graduate work in the field of radiology is provided for the purpose of stimulating research endeavor toward the development of critical investigators and intelligent teachers in this rapidly developing field. The plan involves training of the individual in the techniques indicating the course of the investigation and evaluating changes in the methods and results. Facilities for research on monochromatic and high intensity soft radiations and on the betatron in its relationship to applied physics and radiobiology are available.

For majors in the department the Doctor of Medicine or Doctor of Dental Surgery degree is required with the exception that undergraduate students may be accepted on a selective basis if they are pursuing work toward the Doctor of Medicine degree and fulfill the general requirements for Graduate College admission. The Master of Science degree will not be awarded before completion of requirements for the Doctor of Medicine degree.

Courses required of all candidates are at least four units in Radiology 493 and at least one seminar in a basic science per quarter for three quarters. Attendance is also required at conferences and seminars and at the radiation physics course of thirty-six hours offered jointly by the Department of Radiology and the Cook County Graduate School. Attendance at additional conferences may be required by the department head.

The thesis requirement is the usual standard requirement of the Graduate College and must be based on an original investigation of a suitable problem.

Graduate Teaching Faculty

Professor and Head of Department: ROGER A. HARVEY, M.D., M.S.

Courses for Graduates

493. RESEARCH IN RADIOLOGY. Research in the physical and biological aspects of radiography and radiotherapy using such instruments as monochromatic radiations, high intensity radiations, radioactive isotopes, and the betatron. F, W, Sp, S; 1 to 3 units.

SURGERY

Graduate training in surgery leads to the Master of Science and Doctor of Philosophy degrees and is designed to encourage primarily the value of basic science research in surgical problems such as complications in postoperative care and malnutrition in surgical diseases which are ordinarily the major concern of a surgeon's work. The art of surgery which pertains to surgical technique has no place in the training of candidates for the Master of Science degree. The candidate for the degree of Doctor of Philosophy must devote the major portion of his time to research but must also become exposed to the art of surgical technique though the time so devoted shall not apply toward residence requirements or unit values in the Graduate College. Work in the basic sciences is essential for a well-trained scientific surgeon but this work alone is not sufficient to qualify a candidate for a Doctor of Philosophy degree in surgery. While he might be able to solve problems in surgical disease utilizing fundamental knowledge of physiology or biological chemistry, he must also be cognizant of potential problems in preoperative and postoperative care and surgical convalescence which knowledge can not be achieved by a pursuit of basic sciences alone.

A Doctor of Medicine degree is required for admission with the exception that medical students who have completed two years of the medical curriculum may apply for graduate work toward a Master of Science degree if they fulfill the general requirements for admission to the Graduate College as stated elsewhere. The latter class of candidates will not be granted a graduate degree in surgery until they have completed requirements for the Doctor of Medicine degree.

A minor is not required for the master's degree but candidates are encouraged to pursue basic science course work whenever possible. Registration in at least one seminar course per quarter for three quarters is required in the following offerings: Anatomy 491, Biological Chemistry 491, Clinical Science 491, Bacteriology 491, Pharmacology 491, Physiology 491 and 492, and Pathology 491. In addition, the candidate is expected to attend one additional basic science seminar each week though he need not register for it. Attendance at surgical pathological conferences, journal club, ward rounds and clinics, and surgical research seminars is required.

An applicant for Doctor of Philosophy work must fulfill the general admission requirements as stated elsewhere. He must choose a minor in one of the basic sciences and a graduate faculty member in the basic science department shall be the co-adviser with the candidate's major adviser on his research work and thesis. The candidate for the Doctor of Philosophy degree must register for two seminars per quarter for six quarters of work toward the Doctor of Philosophy degree in the departments as specified above for Master of Science candidates.

Graduate Teaching Faculty

Professor and Head of Department: Warren H. Cole, M.D.
Professor: Charles B. Puestow, Ph.D., M.D.
Associate Professors: Géza de Takats, M.D., M.Surg., Russell D. Herrold, B.S., M.D., Cornelius W. Vermeulen, A.B., M.D.
Assistant Professor: Max S. Sadove, M.D.

Courses for Graduates

493. Research in Surgery. Investigation of problems in surgery, including laboratory and clinical work. F, W, Sp, S; 1 to 3 units.

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